

Systematics of *Schinia chrysellus* (Grote) complex: Revised status of *Schinia alencis* (Harvey) with a description of two new species (Lepidoptera: Noctuidae: Heliothinae)

MICHAEL G. POGUE¹ AND CHARLES E. HARP^{2,3}

¹Systematic Entomology Laboratory, PSI, Agricultural Research Service, U. S. Department of Agriculture, c/o Smithsonian Institution, P.O. Box 37012, NMNH, MRC-168, Washington, DC, 20013-7012, USA
mpogue@sel.barc.usda.gov

²Research Associate: C. P. Gillette Museum of Arthropod Diversity, Colorado State University, Ft. Collins, CO.

³8834 West Quarto Ave., Littleton, CO, 80128, USA cehmoth@aol.com

Table of contents

Abstract	1
Introduction	2
Materials & methods	2
Key to species of the <i>Schinia chrysellus</i> complex	3
<i>Schinia chrysellus</i> (Grote)	4
<i>Schinia chryselloides</i> Pogue and Harp new species	10
<i>Schinia alencis</i> (Harvy) Revised Status	13
<i>Schinia ciliata</i> Smith	16
<i>Schinia rufocostulata</i> Pogue and Harp, new species	21
Acknowledgements	22
Literature Cited	22

Abstract

Based on morphological characters and host plant use, species related to *Schinia chrysellus* (Grote) are revised. *Schinia alencis* (Harvey) is considered a valid species, **revised status**. *Schinia chryselloides*, **new species** is closely allied with *S. chrysellus*, and *Schinia rufocostulata*, **new species** is related to *S. ciliata* Smith. Localities of collected adult moths and their asteraceous host plants are compared and illustrated with distribution maps. Adults and male and female genitalia are illustrated for each species.

Key words: systematics, genitalia, distribution, host plant, Asteraceae

Introduction

This is the sixth in a series of papers resolving taxonomic problems within the large heliothine genus *Schinia* Hübner 1818. Previous papers dealt with various species groups and descriptions of new species (Knudson et al. 2003, Pogue and Harp 2003a, b, c, Pogue and Harp 2004). The purpose of this paper is to review a group of species related to *S. chrysellus* (Grote) 1874, hereafter referred to as the *chrysellus* group.

Species of the *chrysellus* group have shiny white forewings with a basal band and distinct median band in which the reniform spot is either coalesced or separate from the band. The hindwing lacks a discal spot, and the marginal band is indistinct. Based on forewing maculation, morphology of the male and female genitalia, and host plant use and distribution, we recognize five species in the *chrysellus* complex: *S. chrysellus*, *S. chryselloides* **new species**, *S. alencis* Harvey 1875, *S. ciliata* Smith 1900, and *S. rufocostulata* **new species**. Hardwick (1996) recognized only two species, *S. chrysellus* and *S. ciliata* Smith. He also synonymized *S. alencis* (Harvey) with *S. chrysellus*, but gave no explanation for this action.

The geographic distributions of the larval host plants of *S. chrysellus* and *S. ciliata* match the distributions of the moths quite well (Figs. 46, 49). The larval host plants of the species formerly associated with *S. chrysellus* by Hardwick (1996), *S. alencis* and *S. chryselloides*, also show relatively good concordance with their respective moth distributions (Figs. 47–48). The larval host of *S. ciliata*, *Gutierrezia sarothrae* (Pursh) Britton & Rusby (Asteraceae), also matches the known distribution of the moth (Fig. 49). The larval host plant of *S. rufocostulata* is unknown.

Materials & methods

Photographs of adult moths were taken with a Nikon CoolPix® 990 digital camera using an Aristo Grid® lamp for illumination. Images of the heads, legs, and genitalia were taken with a JVC digital camera KY-F70 mounted on a Wild Photomakroskop M 400 stereo dissecting microscope and manipulated with Auto-Montage®. The images were enhanced with Adobe PhotoShop® CS and imported into Adobe Illustrator® 10.0 to make the plates.

Genitalia were dissected following the methods of Pogue (2002) but were mounted in euparal. The vesica was inflated with 99% isopropyl alcohol and stained in Eosin-Y.

ArcView GIS® was used to make the adult distribution maps. Adobe Illustrator® 10.0 was used to overlay the host plant distributions and to make the plates.

Specimen databases are maintained for the Heliothinae of North America using Microsoft EXCEL® and FileMaker Pro® 7. All specimens are bar-coded with a unique number.

Larval host plant names, both common and scientific, were acquired from the Plants Database website (<http://plants.usda.gov/index.html>). Other information regarding the larval host plants, including distribution and phenology, were acquired from this website.

Collections in the following public institutions were examined for material used in this study with acronyms in parentheses: Amarillo College, Amarillo, TX (AC); American Museum of Natural History, New York, NY (AMNH); The Natural History Museum, London, England (BMNH); Brigham Young University, Provo, UT (BYU); Canadian National Collection, Ottawa, ON, Canada (CNC); Colorado State University, Ft. Collins, CO (CSU); Denver Museum of Nature and Science, Denver, CO (DMNS); Fort Hays State University, Hays, KS (FHSU); Field Museum of Natural History, Chicago (FMNH); Kansas State University, Manhattan, KS (KSU); Natural History Museum of Los Angeles County, Los Angeles, CA (LACM); New Mexico State University, Las Cruces, NM (NMSU); Natural and Cultural History Museum, Oklahoma State University, Stillwater, OK (OKS); Oral Roberts University, Tulsa, OK (ORU); Snow Museum of Entomology, University of Kansas, Lawrence, KS (SMEK); Texas A & M University, College Station, TX (TAMU); Texas Lepidoptera Atlas, data of E.C. Knudson and C.W. Bordelon, Houston, TX (TLA); University of Arizona, Tucson, AZ (UAT); Essig Museum of Entomology, University of California, Berkeley, CA (UCB); Bohart Museum, University of California, Davis, CA (UCD); University of Nebraska, Lincoln, NE (UNL); Stovall Museum of Science and History, University of Oklahoma, Norman, OK (UOKN); National Museum of Natural History, Washington, DC (USNM); University of Texas at El Paso, El Paso TX (UTEP); West Texas A & M University, Canyon, TX (WTAMU); University of Wyoming, Laramie, WY (UWY). Private collections examined include: Andrew D. Warren, Corvallis, OR (ADW); Charles A. Ely, Nacogdoches, TX (CAE); Charles E. Harp, Littleton, CO (CEH); Charles W. Bordelon, Houston, TX (CWB); Edward C. Knudson, Houston, TX (ECK); Eric H. Metzler, Columbus, OH (EHM); Hugo Kons, Gainesville, FL (HK); James K. Adams, Calhoun, GA (JKA); Jan Matlevski, Manhattan, KS (JMat); Neil K. Dankert, Kearney, NE (NED); Richard Holland, Albuquerque, NM (RHA); Ronald H. Leuschner, Manhattan Beach, CA (RHL).

Key to species of the *Schinia chrysellus* complex

1. Forewing with reniform spot mostly incorporated into median band (Figs. 4–9) 2
- 1'. Forewing with reniform spot barely coalesced or separate from median band (Figs. 10–15) 3
2. Ventral lip of frons greatly produced, labial palp barely extending past frons (Fig. 16); foretibial claws flat, apices rounded (Fig. 21); apex of forewing lacking a small black patch of scales that extends onto fringe *chrysellus*
- 2'. Ventral lip of frons produced, labial palp projecting well beyond frons (Fig. 17); foretibial claws round, slender, apices pointed (Fig. 22); apex of forewing with a small black patch of scales that extends onto fringe *chryselloides*
3. Forewing with a wide median band (width approximately 25% of forewing length) (Figs. 10–11); reniform spot either separate or barely coalesced with median band

- (Figs. 10–11); scales on thorax narrow overlaying wide scales; foretibial claws flat with rounded apices (Fig. 23) *alencis*
- 3'. Forewing with a narrow median band (width approximately 15% of forewing length) (Figs. 12–15); reniform spot barely coalesced with median band (Figs. 12–15); scales on thorax wide, no narrow scales; foretibial claws slender with pointed apices (Figs. 21–22, 24–25) 4
4. Median band of forewing tan to rufous, variously infused with black scales (Figs. 12–13); thorax dark rufous, not concolorous with median band *ciliata*
- 4'. Median band of forewing bright cinnamon-rufous, lacking black scales (Figs. 14–15); thorax concolorous with median band *rufocostulata*

Schinia chrysellus (Grote)

(Figs. 4–6, 16, 21, 26–27, 36, 39, 46)

Tricopis chrysellus Grote 1874: 76.—Grote 1875: 18.—Grote 1882: 35.—Grote 1883: 152.—Grote 1890: 37.—Grote 1895: 67.

Schinia chrysellus; Barnes and McDunnough 1917: 39.—McDunnough 1938: 105.—Franclemont and Todd 1983: 159.—Hardwick 1996: 189.

Schinia chrysellus; Smith 1883: 227.—Smith 1891: 54.—Smith 1893: 274.—Dyar 1903: 187.—Poole 1989: 893.—Poole and Gentili 1996: 771.

Heliothis conchula Felder & Rogenhofer 1874: pl. 108, fig. 41. —Barnes and McDunnough 1917: 39.—McDunnough 1938: 105.—Franclemont and Todd 1983: 159.—Poole 1989: 893.—Poole and Gentili 1996: 771.—Hardwick 1996: 89.

Heliothis lanul Strecker 1877: 132. Barnes and McDunnough 1917: 39.—Franclemont and Todd 1983: 159.—Hardwick 1996: 189 [synonymized *lanul*].

Lygranthoecia lanul; Grote 1890: 37.

Schinia lanul; Smith 1893: 285.—Grote 1895: 68.—Dyar 1903: 188.—McDunnough 1938: 105.—Franclemont and Todd 1983: 159.—Poole 1989: 895.—Poole and Gentili 1996: 771.

Diagnosis. *Schinia chrysellus* most resembles *chryselloides* and *alencis*. Hardwick (1996) synonymized *alencis* with *chrysellus*, but there are characters that separate these species. The ventral lip of the frons (Fig. 16) is more produced in *chrysellus* than it is in *alencis* (Fig. 18). The spines on the foretibia slightly longer with pointed apices (Fig. 21) in *chrysellus* than the slightly shorter and rounded apices (Fig. 23) in *alencis*. The labial palps are short in *chrysellus* (Fig. 16), but longer and extend well beyond the frons in *chryselloides* (Fig. 17).

Description. Male. *Head:* Frons cream to pale gray, ventral lip greatly produced (Fig. 16); vertex white to light brown; labial palp short, not or barely extending past ventral lip, white speckled with light brown scales; eyes large and globular. *Thorax:* Scales wide, light brown with some white; forefemur with dorsal and inner surface light brown, outer surface white becoming light brown apically; tibia light brown, inner side with largest spine flat, largest spine on inner side flat, a single slender spine dorsal to it, outer side with 4 robust round spines that become progressively shorter proximally; tarsi white on outer surface,

light brown with white apical rings on inner surface; middle and hind legs cream to light brown; tibia spined; tarsi cream to light brown; underside white. *Forewing*: Length 9.56–12.56, mean 11.15 ± 0.9 mm ($n=15$). Ground color shiny white; basal patch light brown; median band light brown with darker brown scales interspersed, especially along the margins, irregularly shaped; reniform spot incorporated into median band and produced toward apex; terminal band light brown with white apex bordered by light brown proximally, proximal margin jagged, small dark brown to black spots on white background between wing veins; fringe white; underside light brown, subapical and apical patch white, white along posterior margin. *Hindwing*: Ground color shiny white; marginal band light brown to gray, lacking a well-defined inner margin; fringe white. *Abdomen*: White; scent pockets and hair pencils on second sternite absent. *Genitalia* (Figs. 26–27): Uncus elongate, approximately 0.3 times length of valve, apex blunt with small hook; valve elongate (length approximately 10 X width), costal margin slightly angulate at 4/5 length, posterior margin gently curved to a narrowly rounded apex; ampulla short (0.04 length of valve); corona with stout spines; sacculus with ventral margin produced; juxta rectangular, height greater than width, ventral margin U-shaped and more sclerotized than rest of juxta; saccus V-shaped; aedoeagus slightly curved, dorsodistal third with fine spines; vesica emerging ventrally, basal diverticulum present, 2 1/2 coils; cornuti finely scobinate.

Female. As in male except forewing length 11.2–12.83, 12.11 ± 0.5 mm ($n=15$). *Genitalia* (Figs. 36, 39): Papilla analis a curved, elongate triangle, apex pointed; posterior apophysis approximately 0.85–0.92 X length of anterior apophysis; ductus bursae membranous, elongate; appendix bursae shorter than corpus bursae, with 1 1/2 coils; corpus bursae ovate; signa 4 scobinate bars.

Type material. *Tricopis chrysellus* Grote: Female holotype is in BMNH. Type locality: Texas. The original description indicates 2 specimens collected, one by Belfrage in Texas and the other by Snow in Kansas, with “No. 192” indicated for the Kansas specimen. The holotype in the BMNH is labeled as being from Texas, but bears the “No. 192” label. Type locality: Clifton, Bosque Co., Texas. Type examined.

Heliothis conchula Felder & Rogenhofer: Male holotype is in BMNH. Type locality: Texas. Type examined.

Heliothis lanul Strecker: Male holotype is in FMNH. Type locality: Texas. Type not examined.

Biology. Adult emergence coincides with host plant blooming in mid August to September. During field observations, females oviposit on pre-bloom flower buds of *Amphiachyris dracunculoides* (DC.) Nutt. (Asteraceae) at dusk, and can be seen darting among the knee-high broomweed plants until dark (Fig. 3). Eggs hatch in three to four days (Hardwick 1996). Early larval instars feed within early blooms, moving to the outsides of the flower after the third instar. Later instars clasp the stems beneath the flowers and consume the flower parts and immature seeds. Flower heads are very small, but numerous on broomweed, so caterpillars move easily between adjacent blooms to continue feeding.

Hardwick (1996) noted that larvae of *chrysellus* complete their development in six or seven stadia, and mean development time for reared larvae was 26.0 days.

Amphiachyris dracunculoides, or prairie broomweed, can be extremely common on disturbed pastures and eroded prairies across western Missouri, the eastern two-thirds of Kansas, south through Oklahoma into central Texas, the Texas panhandle, and southeastern New Mexico. Small populations of the plant occur from western Kentucky to Illinois. The plant is an annual, often growing on clay loams and limestone.

Distribution (Fig. 46). Widely distributed throughout the central part of the United States from south-central Nebraska south through Kansas, Oklahoma, and Texas to Monterrey, Mexico. Collected in extreme southeastern Colorado and New Mexico. There are scattered records in western Missouri, Arkansas, southeastern Louisiana, central Wisconsin, central Illinois, and western Kentucky (Covell 1999).

Material Examined. All specimens are from the National Museum of Natural History (USNM) collection except as noted. **MEXICO: NUEVO LEON:** Monterrey, 5 Sep. 1958 (1 ♂), H.F. Howden (CNC). **U.S.A.: ARKANSAS:** HEMPSTEAD CO. Hope, 9 Sep. 1931 (1 ♂), 11 Sep. 1933 (3 ♂, 2 ♀) (USNM), 8 Sep. 1931 (1 ♂), 13 Sep. 1931 (1 ♀), L. Knobel (CNC). WASHINGTON CO. [No specific locality], 9 Aug. 1964 (1 ♀), E.P. Rouse, 1 Sep. 1966, R.L. Brown (1 ♂). **COLORADO:** [No specific locality], (1 ♀) genitalia slide USNM 46939, H.S. Burnett, (1 ♂). BACA CO. s end Springfield, Hwy. 385/287, 4409 ft., 26 Aug. 2002 (1 ♂, 1 ♀), M.G. Pogue & C.E. Harp, 28 Aug. 2002 (3 ♀), C. Harp (CEH). **ILLINOIS:** PUTNAM CO. [No specific locality], 13 Sep. 1935 (1 ♂), M.O. Glenn. **IOWA:** STORY CO. Ames, 14 Aug. 1919 (1 ♂), A.K. Lindsey. **KANSAS:** BARTON CO. Hoisington, 30 Aug. 1994 (1 ♀), B. White (CAE). BUTLER CO. Towanda Rest stop, 10 km sw El Dorado, 25 Aug. 1986 (1 ♀), J.K. Adams (EHM). CROWLEY CO. Arkansas City, 26 Aug. 1989 (1 ♀), G. Young (CEH), 3 mi e of Arkansas City, 27 Aug. 1989 (1 ♀), G. Young (CAE). DOUGLAS CO. [No specific locality], 5 Aug. 1940 (1 ♂), F. Forbes; Lawrence, Aug. (1 ♀), E.S. Tucker, 22 Aug. 1933 (1 ♀), 29 Aug. 1987 (1 ♀) J.K. Adams (EHM). ELLIS CO. 7.5 mi n, 1 mi e of Ellis, 7 Sep. 1994 (1 ♀), P. Foster (CAE), Hays, 24 Sep. 1981 (1 ♀), M. Rolfs (CAE), Hays, Ft. Hays State University campus, various dates from 2 Sep. 1988 to 28 Sep. 1994 (49 ♀, 1 ♂) C.A. Ely & P. Foster (FHSU). ELLSWORTH CO. 2 mi n, 5 mi e of Ellsworth, 4 Sep. 1994 (2 ♀), P. Foster (CAE) (CEH). FRANKLIN CO. [no specific locality], 14 Aug. 1924, H.K. Gloyd (KSU), [no specific locality], 19 Aug. 1961, W.H. Howe (AMNH), Ottawa, 7 Aug. 1944, W.H. Howe (AMNH), 15 Aug. 1946, W.H. Howe (AMNH), 19 Aug. 1947, W.H. Howe (AMNH). KIOWA CO. Greensburg, 26 Aug. 1994 (1 ♀), G. Salsbury, 5 mi se Greensburg, 13 Aug. 1993 (1 ♀), G. Salsbury (SMEK), 4 mi s Greensburg, 12 Aug. 1991 (1 ♂), G.A. Salsbury (CAE). LABETTE CO. Oswego, 5 Aug. 1961 (1 ♀), 7 Aug. 1964 (1 ♀) genitalia slide USNM 46935, 7 Aug. 1972 (1 ♀), 8 Aug. 1971 (1 ♂), 11 Aug. 1961 (1 ♂), 23 Aug. 1964 (1 ♂), 24 Aug. 1964 (1 ♂), 29 Aug. 1964 (2 ♂), 30 Aug. 1963 (1 ♂) genitalia slide USNM 46934, 4 Sep. 1964 (1 ♀), G. Hevel. PHILLIPS CO. Glade, 5 mi e, 1 mi s, 25 Aug. 1990 (1 ♂), C.J. Ochs (CAE). POTTAWATOMIE CO.

Onaga, 5 Sep. 1920 (1♀), F.F. Crevecouer (KSU), 5 Sep. 1928 (1♂), F.F. Crevecouer (KSU). PRATT CO. Pratt, along Hwy. #281, 1908 ft., 23 Aug. 2000 (1♀), C. Harp (CEH); Sawyer, downtown gas station, off Hwy. #281 at Hwy #42, 1891 ft., 23 Aug. 2000 (1♀), C. Harp (CEH). RILEY CO. Manhattan, 20 Sep. 1935 (2♀), H.H. Walkden, 29 Sep. 1937 (1♂, 1♀), R.R. McElvare, Manhattan, Kansas State Univ. campus, 20–25 Aug. 2003 (2♀), J. Matlevski (JMat). RUSSELL CO. Dorrance, 6 mi n, 6 mi e, 31 Aug. 1991 (1♀), P. Briney (CAE), 1–2 Sep. 1992 (2♀), P. Briney (CAE), 18 Sep. 1993 (1♀), P. Briney (CEH), 4 Sep. 1994 (4♀, 1♂), T. Beach (CAE). SEDGWICK CO. Wichita, (1♀), H.H. Walkden. SHERMAN CO. rest area 7 mi e of Colorado state line, along Hwy. I-70, J.K. Adams (JKA); THOMAS CO. Colby, 21 Sep. 1988 (1♀) V. Wranosky (CAE). TREGO CO. Wakeeney, 1 mi s, 3 mi e, 21 Sep. 1994 (1♀) C.A. Ely (CAE). **KENTUCKY:** CALDWELL CO. Hwy. I-24 at mkr. #56, 26 August 1992, J.K. Adams (JKA). **LOUISIANA:** [No specific locality], (1♀). **MISSOURI:** CLAY CO. Liberty, J.K. Adams (JKA). GREENE CO., Springfield, 17 Sep. 1949, S.K. and A.H. Rindge (AMNH). JACKSON CO. Independence, 28 Aug. 1961 (1♂), 31 Aug. 1961 (1♀), J.R. Heitzman, 27 August 1965, J.R. Heitzman (AMNH); Kansas City, 17 Sep. 1898, 29, 1897, F.J. Hall (AMNH). **NEBRASKA:** BUFFALO CO. Kearney, 17 August 1998 at lights, N.E. Dankert (NED). DOUGLAS CO. Omaha, 16 Sep., F.H. Marshall (AMNH). LANCASTER CO. Lincoln, 22 Aug. 1933 (1♂), D.B. Whelan (CNC), Lincoln, (UNL). **NEW MEXICO:** EDDY CO. Carlsbad, 11 Sep. 1961, M. and E. Roshore (AMNH); White City, 17 Sep. 1963 (2♀), A. & M.E. Blanchard. OTERO CO. High Rolls (1♂). **OKLAHOMA:** ATOKA CO. Hwy. #69 at Limestone Creek, 10 Oct. 1998 (1♀) at lights, J.M. Nelson (ORU). BLAINE CO. Roman Nose State Park, 16 Sep. 1983 at light trap (1♀) Nelson & Reed (OSU). CHEROKEE CO. [No specific locality], 9 Sep. 1978 (1♀) P. Loy (OU). CHOCTAW CO. [no specific locality] (ORU). CLEVELAND CO. Norman, 23 Aug. 1949 (1♀), W.J. Reinthal (CNC), 26 Aug. 1950 (1♀), 18 Sep. 1950 (1♂) W.J. Reinthal (UOKN). COMANCHE CO. Ft. Sill, Lawton, CSU study site, West Range, 16–18 Aug. 2003 @ blacklight, M. Garhart & C. Harp, (4♀, 2♂) (CSU). COTTON CO. 2 mi w of Walters, along Hwy. #53 at 1008 ft. elev., 16–19 Aug. 2003 at building lights at 1008 ft. elev., (2♀, 1♂) M. Garhart & C. Harp (CEH); Temple, along Hwy. #5, 19 Aug. 2003 (1♀) M. Garhart & C. Harp (CEH); s end of Walters along Hwy. #5, 19 Aug. 2003 (3♀, 1♂) M. Garhart & C. Harp (CEH). ELLIS CO. 4 mi ESE Arnett, 2400 ft., 29 Aug. 1975 (1♀), Lafontaine & Bowen (CNC). GARFIELD CO. [No specific locality], 1960 (2♀), J.F. Reinert; s end Garber, along Hwy. #74, 1198 ft., 23 Aug. 2000 (3♀), C. Harp (CEH). GRANT CO. Medford, gas station, along Hwy. #11, 1067 ft., 23 Aug. 2000 (6♀), C. Harp (CEH). JACKSON CO. Altus, s end of town along Hwy. #283 at 1381 ft. elev., 17 Aug. 2003 (1♀) M. Garhart & C. Harp (CEH). JEFFERSON CO. Waurika, 4 mi nw, Hwy. #5 at Beaver Cr. at 882 ft. elev., 18 Aug. 2003 (1♀) M. Garhart & C. Harp (CEH); Waurika, downtown at building lights along Hwy. #5 at 885 ft. elev., 19 Aug. 2003 (1♀) M. Garhart & C. Harp (CEH); Waurika Lake Project Office, s end of lake, 1 mi n of Hwy. #5 at 1154 ft. elev., 18 Aug. 2003 (1♂) M. Garhart & C. Harp

(CEH). LINCOLN CO. Chandler, nw edge of Old City Lake, 928 ft., 26 Aug. 1991 (1♀), C. and C. Harp (CEH). OKLAHOMA CO. 3 mi sw of Luther, Rustic Acres Rd. nr Hwy. I-44, 980 ft., 10 Aug. 1991 (1♀), 17 Aug. 1991 (1♀), 19 Aug. 1991 (2♀), 20 Aug. 1991 (1♀), 21 Aug. 1991 (1♀), 22 Aug. 1991 (1♀), 24 Aug. 1991 (1♀), 25 Aug. 1991 (2♂, 1♀), 30 Aug. 1991 (1♀), C. Harp (CEH); Oklahoma City, 16 Sep. 1949, S.K. and A.H. Rindge (AMNH). PAYNE CO. Stillwater, 1 Sep. 1932 (2♀, 1♂), 9 Aug. 1933 (1♀) E. Hixon (OKS), 24 Aug. 1959 (1♂) W.A. Drew (OKS), 30 July 1972 (2♀), 7 Aug. 1972 (1♂), 14 Aug. 1972 (1♂), 15 Aug. 1972 (1♀, 1♂), 17 Aug. 1972 (1♀), 22 Aug. 1972 (1♀), 31 Aug. 1972 (1♂), 21 Sep. 1973 (1♀), 22 Sep. 1973 (1♀), 24 Sep. 1973 (1♂) D.R. Molnar (OKS), 1 Sep. 1980 (1♀), 1 Sep. 1981 (1♀), 2 Sep. 1982 (1♂), 7 Sep. 1983 (1♀), 20 Aug. 1985 (2♀, 1♂), 3 Sep. 1985 (1♀), 3 Sep. 1986 (1♀), D.C. Arnold (OKS), 5 Sep. 1982 (1♀), 7 Sep. 1982 (1♂), 13 Sept. 1982 (1♀), 17 Sep. 1982 (1♀), R.K. Whittle (OKS). POTTAWATOMIE CO. 3.5 mi s of McCloud along Hwy. I-40 at 1104 ft. elev., 24 Aug. 2000 (3♀, 1♂) C. Harp (CEH). ROGERS CO. Claremore, (ORU). SEQUOYAH CO. Lake Tenkiller, 2 mi nw Blackgum, 25–29 Aug. 1982 (1♂), D. & M. Davis; Lake Tenkiller, nr. Cookson, 16–19 Aug. 1962 (1♀) D.R. Davis; TULSA CO. Tulsa, 16 Sep. 1940 (1♀), G. Willett, 31 Aug. 1981 (2♀), 5 Sep. 1984 (1♀), 22 Aug. 1985, 27 Aug. 1985, J.T. Criswell (OKS); Oral Roberts University campus, Sep. 4–25, 1991, J. Nelson (ORU). **TEXAS:** [No specific locality], 1885 (1♀), C.V. Riley Coll., (2♂, 5♀)6♀ Barnes Coll., (1♂, 1♀) Brooklyn Mus. Coll., (1♀) E.T. Owen, (4♂) J.B. Smith Coll., (1♀) O. Meske, (1♀) W. Schaus Coll., 26 Sep. 1904 (1♀), (2♂, 2♀). ANDERSON CO. Tennessee Colony, 23 Aug. 1978 (1♂), A. & M.E. Blanchard. BASTROP CO. [No specific locality], 2 Sep. 1964 (1♂), 29 Sep. 1964 (3♂); Bastrop State Park, 28 Sep. 1964 (1♂, 1♀), 6 Oct. 1963 (1♀), A. & M.E. Blanchard, Bastrop State Park, (LACM). BELL CO. 6 mi nw Temple, Hwy. 36, 20 Sep. 1978 (1♀), Robbins & Blankenship. BEXAR CO. San Antonio, (1♂); San Antonio, Mt. View Acres, 9 Sep. 1971 (1♀), A. & M.E. Blanchard; San Antonio, Ebony Hill Res. Sta. (Kendall residence), 27 May 1992 (1♀), E.G. Riley (TAMU); San Antonio, 20 Sep. 1940, (1♀) K.C. Emerson (OKS), 16 Sep. 1994 (1♀) J.K. Adams (DMNS), 17 Oct. 1937 (2♀, 1♂) G.H. and J. Sperry (AMNH); se of San Antonio, Hwy. I-37 at exits #125 and 130, J.K. Adams (JKA). BLANCO CO. Blanco, 24 Sep. 1964, A. & M.E. Blanchard (AMNH). BOSQUE CO. Clifton, Belfrage, (1♂); Laguna Park, 24 Sep. 1970 (1♂, 3♀), (4♀, 2♂) (AMNH), A. & M.E. Blanchard. BRAZOS CO. College Station, 9 May 1917 (1♀), 15–30 May 1917 (1♀), P.O. Glick, 14 June (1♂), P.O. Glick, 10–17 Aug. (1♂), Sep. (1♀) (USNM), 14 Sep. 1978 (2♂), 9 Sep. 1980 (1♀), 4 Oct. 1978 (1♀), R. S. Peigler (CNC), 8 Sep. 1978 (1♀), 9 Sep. 1978 (1♀), 14 Sep. 1978 (1♂, 1♀), R.S. Peigler, 4 Oct. 1928 (1♂, 1♀), 11 Oct. 1928 (1♀), 13 Oct. 1928 (2♂), 14 Oct. 1928 (3♂, 3♀), 16 Oct. 1928 (1♀), S.E. Jones, 10 Sep. 1904 (1♀), 14 6 Oct. (1♀), 8 Oct. 1903 (1♂), 14 Oct. 1903 (1♀), [No collector], 7 Oct. 1987 (1♀), H.R. Burke, College Station, Riley Estate, 4–5 Sep. 2002 (1♂), 11–14 Sep. 2002 (2♂, 2♀), 24–26 Sep. 2002 (1♀), 27–29 Sep. 2002 (2♂), E.G. Riley, College Station, Texas Exp. Station, 4 Sep. 1957 (1♀), 10 Sep. 1956 (1♀), 14 Sep. 1956 (1♂) (TAMU);

College Station, 28 Sep. 1976, R.S. Peigler (AMNH). BREWSTER CO. 6.5 mi s Alpine, 9 Aug. 1991 (1♂), E.H. Metzler (EHM); Alpine, Davis Mountains, 2 Sep. 1960 (1♀), 2 Sep. 1940 (1♂), 11 Sep. 1958 (1♀), 12 Sep. 1958 (1♂); Alpine, 1–7 July 1926 (1♀), 15–21 July 1926 (1♂), 1–7 Sep. 1925 (1♂), O.C. Poling, 13 Sep. 1963 (1♀), 14 Sep. 1963 (1♂), A. & M.E. Blanchard; Alpine, Davis Mountains (LACM). BRISCOE CO. Caprock Canyon State Park, 29–30 Aug. 1994 (1♀), 2–3 Sep. 1996 (1♀), E.C. Knudson (ECK). BROWN CO. Lake Brownwood State Park, 7 Sep. 1963 (1♂), A. & M.E. Blanchard. BURNET CO. Shovel Mountain, (3♂), Barnes Collection, 12 Apr. [probably wrong month] 1902 (1♀); [No specific locality], 1 Sep. 1902 (20♀, 7♂) (AMNH). CAMERON CO. Laguna Atascosa, 22 Sep. 1973 (1♂), 25 Sep. 1973 (1♂), A. & M.E. Blanchard, July (1♀), P.O. Glick; La Feria, 4 Oct. 1974 (1♀), P.T. Riehard (TAMU). CHAMBERS CO. Blackjack Springs, (1♂, 1♀). COLIN CO. Plano, (AMNH). COTTLE CO. Paducah, 19 Aug. 1971 (3♂), 8 Sep. 1966 (1♂), A. & M.E. Blanchard; 8 mi nw Paducah, 1800 ft., 23 Sep. 1968 (2♂, 1♀), D. F. Hardwick (CNC). CULBERSON CO. Guadalupe Mtn. NP, Pine Springs cmpgd, 19 Aug. 1986, R. Holland (AMNH). DALLAS CO. Dallas, 27 July 1911 (1♀), H. Pinkus, 22 Aug. 1905 (1♂), F.C. Bishop, 27 Sep. 1911 (1♀), (1♀), J.B. Smith Coll.; vic. Dallas, 8 Sep. 1979 (1♀), R.A. Rahn, 30 Oct. 1947 (11♀, 5♂) S.K. & A.H. Rindge (AMNH). DONLEY CO. [no specific locality] (TLA). EL PASO CO. [no specific locality] (TLA). ERATH CO. Stephenville, 25 Sep. 1983 (1♀), C.W. Agnew, 28 Sep. 1972 (1♂, 1♀), 8 Oct. 1972 (1♂), 18 Oct. 1971 (1♀), P.T. Riehard (TAMU). HARRIS CO. Houston, 17 Sep. 1965 (1♂), A. & M.E. Blanchard, (2♀) (AMNH). HEMPHILL CO. 6 mi E Canadian, 2000 ft., 30 Aug. 1975 (1♀), 2 Sep. 1975 (1♂), Lafontaine & Bowen (CNC). HIDALGO CO. Mercedes, 4 Oct. 1958 (3♀, 1♂), H. Smalzried (AMNH). JACKSON CO. Deutschburg, 7 Oct. 1974 (1♂), A. & M.E. Blanchard. JEFF DAVIS CO. Davis Mountains, Limpia Canyon, 8 Aug. 1991 (1♂, 2♀), E.H. Metzler (EHM). JIM WELLS CO. [no specific locality] (TLA). KERR CO. Kerrville, 19 Aug. 1980 (1♂), 19 Aug. 1909 (2♀), 2 Sep. 1906 (1♂), F.C. Pratt, 20 Sep. 1951 (1♂), A.B. Gurney, 7 Sep. 1958 (31♂, 14♀), R.R. McElvare, Sep. 1909 (1♂), (6♂, 2♀), Barnes Coll., (5♂) (USNM), (1♀), Coll. Wooley-Dod. (CNC), 5 Sep. 1964 (2♂), W.F. Chamberlain (TAMU), 11 Sep. (1♂), H. Lacey (UCB). KIMBLE CO. Junction, 21 Aug. 1973 (1♂), 18 Sep. 1968 (1♀), A. & M.E. Blanchard, (2♀) (AMNH). LLANO CO. [no specific locality] (TLA). MIDLAND CO. [no specific locality] (LACM). MONTAGUE CO. [No specific locality], 5 Aug. 1940 (9♂, 1♀), 19 Aug. 1940 (1♂), 28 Aug. 1940 (1♂), 29 Aug. 1940 (1♂, 1♀), 4 Sep. 1940 (1♂, 2♀), 7 Sep. 1941 (1♂), 5 Aug. 1940 (1♂, 1♀) R.R. McElvare (AMNH), 30 Aug. 1940, R.R. McElvare (UWY), (8♂, 12♀) L.H. Bridwell (AMNH). NACOGDOCHES CO. 5 mi s of Nacogdoches, 13 Sep. 1996 (1♀), C.A. Ely (CAE). NUECES CO. N. Padre Island, 9 Sep. 1974 (1♀), A. & M.E. Blanchard; Nueces River, (1♂), B. Neumögen. PARKER CO. [no specific locality] (LACM); Weatherford (LACM). WEBB CO. Laredo, (LACM). POTTER CO. Amarillo, 28 Aug. 1979 (1♀), M.S. Brown (CEH), (1♂), M.S. Brown (AC), 4–10 Oct. 1977 (1♂, 1♀), 24–30 Aug. 1977 (2♀), R.E. Howard (BYU). RANDALL CO. Palo Duro Canyon, 1 Sep. 1996, C.W.

Bordelon (CWB). REEVES CO. [no specific locality] (LACM). SAN PATRICIO CO. Sinton, Welder Wildlife Refuge, 8 Oct. 1963 (2♀), 10 Oct. 1964 (1♂), 11 Oct. 1964 (1♂), 12 Oct. 1964 (1♂, 1♀), A. & M.E. Blanchard (USNM), 23 Sep. 1984 (1♀), 24 Sep. 1984 (1♀), 26 Sep. 1984 (2♀), 2 Oct. 1984 (1♂), emerged Nov. 1984 (1♂) reared on *Gutierrezia*, D.F. Hardwick (CNC), 4 Oct. 1964 (AMNH), 12 Oct. 1988 (1♂, 1♀), 12–13 Oct. 1988 (1♂, 1♀), E.G. Riley (TAMU). STARR CO. Fronton, 23 Oct. 1995 (1♀), E.C. Knudson (ECK). TARRANT CO. Benchrock, 12 Sep. 1974 (1♀), E.C. Knudson; Ft. Worth, 9 Sep. 1963 (1♀), 14 Sep. 1962 (1♀), 30 Sep. 1963 (1♂), E. Jackh. TAYLOR CO. [no specific locality] (TLA). TERRELL CO. [no specific locality] (TLA). TOM GREEN CO. Grape Creek, 1980 ft., 3 Oct. 1994 (1♂), D.E. Bowman (CSU). TRAVIS CO. Austin, 6 Oct. 1952 (2♂, 4♀), A.H. & S.K. Rindge (AMNH). UVALDE CO. Sabinal, Sep. 1910 (1♀), Oct. 1910 (1♀), F.C. Pratt; Concan, 14 Oct. 1993 (1♂), C. Bordelon (CEH), Concan, Neal's Lodge, 1 Oct. 1994 (1♂, 1♀), E.G. Riley (TAMU). VAL VERDE CO. Lake Walk, 3 Oct. 1963 (3♂, 4♀), 4 Oct. 1963 (2♀), A. & M.E. Blanchard. WASHINGTON CO. [no specific locality] (TLA). WICHITA CO. Wichita Falls, 29 Sep. 1943 (5♂, 7♀), A.H. Rindge (AMNH). NO COUNTY: Rock Springs, 9 Sep. 1958 (5♂, 1♀), R.R. McElvare; Tiger Hill, (3♀). **WISCONSIN:** PORTAGE CO. (no specific locality), 13 Sep. 1993, H. Kons, Jr. (HK).

Discussion. *S. lanul* (Fig. 6) is an aberrant form of *S. chrysellus*. The white shining ground color is opaque white and is mostly filled with thin pale rufous-tan lines that result in fine white lines adjacent to the rufous-tan median band. The terminal area is also filled with rufous-tan. The produced ventral lip is diagnostic for *S. chrysellus*, and *S. lanul* has this character.

Color variation in the forewing median band varies from a golden brown to dark brown depending on the number of dark brown scales present in the median band. Median band width is somewhat variable. The form of the median band can vary in the degree of the produced portion, with it becoming a more discrete round spot, but never separated from the band.

***Schinia chryselloides* Pogue and Harp new species**

(Figs. 1-2, 7-9, 17, 22, 28-29, 37, 40, 47)

Diagnosis. *Schinia chryselloides* is most closely related to *S. chrysellus*, based on the virtually identical forewing maculation. The only difference is the black scaling at the apex of the forewing in *chryselloides*, which is absent in *chrysellus*. The best way to separate these two species is by the size of the ventral projection of the frons and size of the labial palps. In *chrysellus* this projection is very broad and quite produced and the labial palps are reduced and barely extend beyond the frons (Fig. 16); in *chryselloides* the projection is narrower, less produced, and the labial palps project well beyond the frons (Fig. 17). The foretibial claws are round in *chryselloides* (Fig. 22) and flat in *chrysellus* (Fig. 21). In the

male genitalia the vesica has 2 1/2 coils in *chrysellus* (Fig. 27) and 3 coils in *chryselloides* (Fig. 29). In the female genitalia the papillae analis is an elongate, curved triangle with a pointed apex in *chrysellus* (Fig. 39); and in *chryselloides* it is a broad triangle with a narrowly rounded apex (Fig. 40). The papillae analis is usually sticking out of the abdomen in the females, so dissection is not necessary to observe this character.

Description. Male. *Head:* Frons white to cream, ventral projection moderately produced (Fig. 17); vertex light brown; labial palp long, extends beyond frons, white; eyes large and globular. *Thorax:* Scales wide, light brown; forefemur with dorsal and inner surface light brownish-gray, outer surface white becoming light brownish-gray apically; tibia with proximal half light brownish-gray and distal half white, largest spine on inner side round robust, 2–3 slender spines dorsal to it, outer side with 4 robust round spines that become progressively shorter proximally; tarsi light brownish-gray with white apical rings; middle femur with dorsal and inner surface light brownish-gray, outer surface white becoming light brownish-gray apically; tibia light brownish-gray with white apical ring; tarsi light brownish-gray with white apical rings; hind femur white; tibia white; basitarsus white, rest tan with white apical rings; underside white. *Forewing:* Length 9.2–12.83, mean 11.21 ± 1.21 mm (n=12). Ground color shiny white; basal patch light brown; median band light brown with darker brown scales interspersed, edged with black, irregularly shaped; reniform spot incorporated into median band and produced toward apex; terminal band with white apex bordered by light brown proximally, a few rufous scales becoming light brown to approximately 2/3 length, rest white, proximal margin jagged; small black spots between wing veins; fringe with short scales at apex black, becoming light brown toward tornus, longer scales white; underside gray, subapical and apical patch white, variably distinct white band at approximately 2/3 length below end of discal cell, white spots between veins along margin. *Hindwing:* Ground color shiny white; marginal band light gray, lacking a well-defined inner margin; fringe white. *Abdomen:* Dorsum white with some scattered light brown scales, distal border of sternites cream, ventrum white; scent pockets and hair pencils on second sternite absent. *Genitalia* (Figs. 28–29): Uncus elongate, approximately 0.3 times length of valve, apex blunt with small hook; valve moderate to elongate (length approximately 6.7–9.1 X width), costal margin gently curved, posterior margin angulate at 2/3 length, apex round; ampulla minute (0.01 length of valve); corona with stout spines; sacculus with ventral margin produced; juxta rectangular, height greater than width, ventral margin U-shaped and more sclerotized than rest of juxta; saccus V-shaped; aedoeagus slightly curved, dorsodistal third with fine spines; vesica emerging ventrally, basal diverticulum present, 3 coils; cornuti finely scobinate.

Female. As in male except forewing length 10.0–12.83, 11.55 ± 0.98 mm (n=11). *Genitalia* (Figs. 37, 40): Papilla analis a broad triangle, apex narrowly rounded; posterior apophysis approximately 0.65–0.75 X length of anterior apophysis; ductus bursae membranous, elongate; appendix bursae shorter than corpus bursae, with 1 1/2 coils; corpus bursae ovate; signa 4 scobinate bars.

Type material. HOLOTYPE: ♀, Colorado, Elbert Co., Elizabeth, lights of new grocery mall, > 11 pm., 39° 21' 39" N, 104° 36' 37" W, June 24, 2000, 6341 ft., leg: Chuck & M. J. Harp, USNM ENT 00220214. Deposited in USNM.

Biology. Adult emergence coincides with host plant blooming in early June in western Oklahoma and mid to late June on the plains of eastern Colorado. Records from south-central New Mexico show flight in early July. Specimens from western and central Texas and southeastern Colorado show flights from August to September, suggesting a partial second brood or a late corresponding bloom. Females oviposit on pre-bloom buds of *Heterotheca villosa* (Pursh) Shinnery var. *nana* (Gray) Semple (Asteraceae) (Figs. 1–2). *Heterotheca villosa* var. *nana*, or hairy false goldenaster, is a weedy perennial forb that can be plentiful on cobbly soils of the plains from western Nebraska and eastern Wyoming to the central plains of Texas, west to New Mexico and northeastern Arizona. Soils are usually mixed with sandy loams of gypsum and bentonite origins.

Adult female chryselloides lay their eggs on buds and open flowers at dusk and can be seen flying among the low plants in open areas through the evening hours until dark. The larval biology is unknown.

Schinia chryselloides flies with the first brood of *Schinia meadi* (Grote) in areas adjacent to sandy washes, but generally flies earlier than other species in the *chrysellus* group. Specimens collected in August fly with *S. ciliata*, *S. tertia* (Grote), *S. grandimedia* Hardwick, *S. citrinella* (Grote & Robinson), *S. mortua* Grote, *S. cumatilis* (Grote), *S. reniformis* Smith, second brood *S. meadi*, *S. jaguarina* (Guenée), *S. errans* Smith, *S. siren* (Strecker), *S. lynx* (Guenée), *S. coercita* (Grote), and *S. unimacula* Smith (southeastern Colorado).

The host plant distribution (Fig. 47) is a relatively good fit except for adult records from southern Arizona and southern Texas.

Distribution (Fig. 47). In Colorado from the base of the foothills in Jefferson Co. east to Lincoln Co., in extreme southeastern Colorado, south to southeastern Socorro Co., New Mexico, and east to the southeastern panhandle of Texas and extreme southern Texas.

Material Examined. All specimens are from the National Museum of Natural History collection except as noted. PARATYPES: **U.S.A.: COLORADO:** [No specific locality], (1 ♀), genitalia slide USNM 46940, Barnes Collection, (1 ♂, 1 ♀) Oslar. ARAPAHOE CO. Byers, 16 Jul. 1996 (2 ♀) R.S. Peigler (DMNS); Cherry Creek State Park, 17 Jun. 1997, A.D. Warren (ADW). BACA CO. Picture Canyon, Comanche National Grasslands, sw Campo, 25 Aug. 2002 (7 ♂, 1 ♀), ♂ genitalia USNM slide 47104, ♀ genitalia slide USNM 47110, ♀ genitalia slide USNM 47105, M.G. Pogue & C.E. Harp; Picture Canyon, N of Picnic Area, sw Campo, 4282 ft., 25 Aug. 2002 (1 ♂, 1 ♀), M.G. Pogue & C.E. Harp. DENVER CO. Denver, (1 ♂, 1 ♀), W. Schaus Coll. DOUGLAS CO. Sedalia, 5850 ft., July 1962 (1 ♀) (CSU); Franktown, Hwy. #86 at Hwy. #83, 30 Jun. 2002 at lights (1 ♀), C. Harp (CEH). ELBERT CO. Elizabeth, lights of new grocery mall, 6341 ft., 24 June 2000 (11 ♂, 5 ♀), ♂ genitalia slides MGP 1147-8, C. & M. J. Harp, 24 June 2002 (2 ♂, 11 ♀), C. Harp (CEH); Elizabeth, Hwy. #86, lights of Safeway grocery store, 6341 ft., 30 June 2002 (3 ♂,

2♀), ♀ genitalia slide MGP 1149, C. Harp (CEH). JEFFERSON CO. Golden, Chimney Gulch, 28 Aug. 1908 (1♀), Oslar; Littleton, Stony Creek Addition open park, 6230 ft., 12 Aug. 1999 (1♂), C. Harp (CEH). LINCOLN CO. Limon, s of Hwy. I-70 at exit #361 at gas station lights, 5356 ft. elev., 11 Jul. 2002 (1♀), C. Harp (CEH). **NEW MEXICO:** VALENCIA CO. sw of Becker, roadside along Hwy. #47 at 5219 ft. elev., 8 Aug. 2002 on *Heterotheca villosa* (1♀), C. Harp (CEH). **OKLAHOMA:** BEAVER CO. Beaver River WMA at blacklight, 6 June 1993 (1♀), J.M. Nelson (ORU). CIMARRON CO. Black Mesa State Park at mercury vapor light, 24 Aug. 2004 (1♀), M.G. Pogue & C.E. Harp (CEH). JACKSON CO. Rt. #6 at the Red River at blacklight, 30 August 2002 (1♀), J.M. Nelson (ORU). JEFFERSON CO. 4 mi n of Waurika, along Hwy. 6 at Beaver Crk., 882 ft. elev., 18 Aug. 2004 (1♀), M. Garhart & C. Harp (CEH). TILLMAN CO. Lake Frederick at blacklight, 9 June 2003 (1♀), J.M. Nelson (ORU). **TEXAS:** CAMERON CO. Laguna Atascosa, 25 Sep. 1973 (1♂), A. & M.E. Blanchard. COTTLE CO. Paducah, 19 Aug. 1971 (3♂), A. & M.E. Blanchard. HEMPHILL CO. Gene Howe Wildlife Management Area, 18 May 1985 (1♂), E.C. Knudson (ECK). JEFF DAVIS CO. Davis Mtns. State Park, 14–17 Aug. 1982 (1♂), T.P. Friedlander (TAMU); W. of Ft. Davis on SR 118, Limpia Canyon, 17 Aug. 1974 (1♀), H. Greenbaum (TAMU). Paratypes deposited in CNC and BMNH.

Etymology: The suffix *-oides*, meaning likeness, was added to the root of *chrysellus* to show its close relationship with that species.

Discussion. We selected a female as the holotype, because the genitalia are easily differentiated between *chryselloides* and *chrysellus*.

There is some variation in the color of the forewing maculation. Some specimens have more rufous in the median band and less black scaling in the terminal area.

***Schinia alencis* (Harvy) Revised Status**

(Figs. 10–11, 18, 23, 30–31, 38, 41, 48)

Tricopis alencis Harvey 1875: 117.—Hardwick 1996: 189 [synonym of *chrysellus*].

Tricopis aleucis auth., misspelling; Grote 1875: 18.—Grote 1882: 35.—Grote 1883: 153.—Grote 1890: 37.—Grote 1895: 67.

Schinia aleucis auth, misspelling; Smith 1891: 54.—Smith 1893: 275.—Dyar 1903: 188. — Barnes and McDunnough 1917: 39.—McDunnough 1938: 105.

Schinia alencis; Franclemont and Todd 1983:159.—Poole 1989: 892.—Poole and Gentili 1996: 771.

Diagnosis. *Schinia alencis* can be separated from *S. chrysellus* by the form of the median band in the forewing, which has jagged, irregular margins in *alencis* (Figs. 10–11) and is less irregular in *chrysellus* (Figs. 4–5). The reniform spot is either just contiguous or separate from the median band in *alencis*, but is more absorbed by the median band and never separate in *chrysellus*. The ventral projection of the frons is more produced in *chrysellus* (Fig. 16) than in *alencis* (Fig. 18). In the female genitalia the papillae analis is straight to slightly curved in *alencis* (Fig. 41) and is obviously curved in *chrysellus* (Fig. 39).

Description. Male. *Head:* Frons white, ventral lip moderately produced (Fig. 18); vertex white; labial palp long, extends beyond frons, white; eyes large and globular. *Thorax:* Narrow scales overlaying wide scales, white to light brown; forefemur with dorsal and inner surface tan, outer surface white becoming light tan apically; tibia white with some tan scales medially, largest spine on inner side flat, 2 slender spines dorsal to it, outer side with 4 flat spines that become progressively shorter proximally; tarsi tan with white apical rings on dorsal surface, ventral surface white; middle femur with dorsal surface cream, ventral surface white; tibia cream with white apical ring; tarsi tan with white apical rings; hind femur white; tibia white to tan; tarsi tan with white apical rings; underside white. *Forewing:* Length 9.72–11.75, mean 10.86 ± 0.63 mm (n=11). Ground color shiny white; basal patch tan to brown; median band broad with wavy margins, light brown to brown and variably over scaled with brown to black; reniform spot round, concolorous with median band, can be variously ringed with black scales, can be contiguous or separate from median band; terminal band broad, tan, subapical spot white, an irregular white vertical band from middle to tornus, black spots at margin between veins with largest at apex and become progressively smaller toward tornus with most never reaching tornus; fringe with short scales concolorous with terminal band, longer scales white, a few black scales at apex; underside gray, subapical and apical patch white, variably distinct white band at approximately 2/3 length below end of discal cell, white along posterior margin. *Hind-wing:* Ground color shiny white; marginal band pale grayish-tan, lacking a well-defined inner margin; fringe white. *Abdomen:* White, distal border of sternites cream; scent pockets and hair pencils on second sternite absent. *Genitalia* (Figs. 30–31): Uncus elongate, approximately 0.3–0.35 times length of valve, apex blunt with small hook; valve elongate (length approximately 8.3–9.1 X width), costal margin gently curved, posterior margin angulate at 2/3 length, apex round; ampulla short to long (0.02–0.06 length of valve); corona with stout spines; sacculus with ventral margin produced; juxta rectangular, height greater than width, ventral margin U-shaped and more sclerotized than rest of juxta; saccus V-shaped; aedoeagus slightly curved, dorsodistal third with fine spines; vesica emerging ventrally, basal diverticulum present, 2 1/2 coils; cornuti finely scobinate.

Female. As in male except forewing length 9.86–11.61, 10.84 ± 0.54 mm (n=11). *Genitalia* (Figs. 38, 41): Papilla analis a slightly curved elongate triangle, apex pointed; posterior apophysis approximately 0.81–0.89 X length of anterior apophysis; ductus bursae membranous, elongate; appendix bursae shorter than corpus bursae, with 2 1/2 coils; corpus bursae ovate; signa 4 scobinate bars.

Type material. *Tricopis alencis* (Harvey): Male holotype is in BMNH. Type locality: Texas. A genitalic dissection of the holotype is labelled BMNH 650. Type examined.

Biology. The life history of *Schinia alencis* is poorly understood. The larval host plant for *S. alencis* is suspected to be *Heterotheca canescens* (DC.) Shinnars (Asteraceae), because a female was observed on immature blooms of this plant at Ft. Sill, Comanche Co., Oklahoma in August 2003. *Heterotheca canescens*, or hoary false goldenaster, is

found on prairies, open hills, and roadsides over much of the same range as *alencis*, and grows in red, brown, or black sandy calcareous clay soils, igneous soils, and sandy gypsiferous loamy soils over its distribution (Semple 1996). Hoary false goldenaster occurs at several of the same localities as *Schinia alencis* in Oklahoma, Kansas, and New Mexico. This host plant association needs to be confirmed by larval rearings.

Schinia alencis flies with *chrysellus* in southwestern Oklahoma and central Kansas, but flies with *Schinia ciliata* in northeastern New Mexico and southeastern Colorado.

The distribution of this host corresponds with the known collecting localities of *S. alencis*, except for moth records in central and southern New Mexico (Fig. 48).

Distribution (Fig. 48). From southeastern Colorado to southeastern Arizona east to western Oklahoma, northern Texas to southwestern and southeastern Texas.

Material Examined. All specimens are from the National Museum of Natural History (USNM) collection except as noted. **U.S.A.: ARIZONA:** COCHISE CO. Paradise, 1–7 July (1♂, 1♀), ♀ genitalia slide USNM 47108, Barnes Coll. **COLORADO:** [No specific locality] (3♀, 1♂), Bruce. BACA CO. Picture Canyon, n of Picnic Area, sw of Campo, 4282 ft., 26 Aug. 2002 (1♀), genitalia slide USNM 47106, M.G. Pogue & C.E. Harp; Picture Canyon at parking area, 4255 ft., 29 Aug. 2002 (1♀), C. Harp (CEH); S end of Springfield, Hwy. 385/287, 4409 ft., 26 Aug. 2002 (1♂), genitalia slide USNM 47107, M.G. Pogue & C.E. Harp, 28 Aug. 2002 (1♀), C. Harp (CEH). **KANSAS:** RILEY CO. Manhattan, campus of Kansas State University, 20–25 Sep. 20–25, 2003 (1♀), J. Matlevski (KSU). **NEW MEXICO:** [No specific locality], southern, 23–30 Aug. (2♀), 1–10 Sep. (1♀), Poling. EDDY CO. White City, 16 Sep. 1963 (1♀), A. & M.E. Blanchard. LUNA CO. Deming, 1–7 July (3♂, 2♀), Barnes Coll., no date (2♀). OTERO CO. High Rolls, Sep. (1♂). UNION CO. Clayton, 29 Aug. 1964 (1♀). QUAY CO. San Jon, 12 Sep. 2003 (1♂) C. Harp (CEH). TORRANCE CO. Gran Quivera, 10 Aug. 1994 (1♀) D.E. Bowman (CSU). UNION CO. Clayton, 29 Aug. 1964 (1♀). **OKLAHOMA:** COMANCHE CO. Ft. Sill, Lawton, CSU study site, West Range, 17–18 Aug. 2003 @ blacklight, M. Garhart & C. Harp, (1♂) (CSU). COTTON CO. 2 mi w of Walters, along Hwy. #53 at 1008 ft. elev., 18 Aug. 2003 at building lights, (1♀) M. Garhart & C. Harp (CEH). JEFFERSON CO. Ryan at blacklight, 3 Sep. 1993 (3♀), J.M. Nelson (ORU). STEPHENS CO., Lake Fuqua at blacklight, 29 Aug. 1993 (1♂, 1♀), J.M. Nelson (ORU). TEXAS CO. Lake Optima at blacklight, 5 Sep. 1993 (1♀), J.M. Nelson (ORU). **TEXAS:** [No specific locality], (2♂) Barnes Coll., (1♂) Brooklyn Mus. Coll., (2♂, 1♀) G.D. Hulst, (1♂) O. Meske, (3♀). BASTROP CO. Bastrop State Park, 28 Sep. 1964 (1♀), A. & M.E. Blanchard. BEXAR CO. San Antonio, (1♀). BOSQUE CO. Clifton, (1♂, 1♀), Belfrage. BRAZOS CO. College Station, 20 Sep. 1978 (1♂), 12 Oct. 1978 (1♀), R.S. Peigler, 4 Oct. 1928 (1♀), S.E. Jones (TAMU). BREWSTER CO. Alpine, 8–14 July 1926 (2♂), 22–31 Aug. 1926 (1♂, 1♀), 1–7 Sep. 1926 (1♂, 2♀), 8–14 Sep. 1926 (1♂, 1♀), O.C. Poling, 9 Sep. 1963 (1♂), 11 Sep. 1963 (2♀), 12 Sep. 1963 (1♂), 14 Sep. 1963 (1♀), genitalia slide USNM 47113, 18 Sep. 1963 (2♂, 2♀), A. & M.E. Blanchard; Alpine, Davis Mountains, 1 Sep. 1958 (1♀), 2 Sep. 1958

(3♂), 3 Sep. 1960 (1♀), 10 Sep. 1958 (5♂), R.R. McElvare; 10 mi S Alpine, Davis Mountains, 6 Sep. 1960 (1♂, 4♀), R.R. McElvare; Big Bend National Park, Gov. Spring, 23 Sep. 1963 (1♂), genitalia slide USNM 47109, A. & M.E. Blanchard; Big Bend National Park, Oak Spring, 26 Aug. 1965 (1♀), A. & M.E. Blanchard. BURNET CO. Shovel Mountain, (1♀), Barnes Coll. CHAMBERS CO. Black Jack Springs, (1♂). CHILDRESS CO. 10 mi n of Childress, 31 Aug. 1996, C.W. Bordelon (CWB). COTTLE CO. Paducah, 8 Sep. 1966 (1♂, 1♀), A. & M.E. Blanchard. CULBERSON CO. Guadalupe Mts. National Park, Ship on Desert, 6–8 Sep. 1991 (1♂), E.C. Knudson (TAMU), (1♂), (AMNH). EL PASO CO. Hueco Tanks State Park, 23 Sep. 1995 (1♂), E.C. Knudson (ECK), 19 Sep. 1998 (1♀), R.D. Worthington (UTEP), Franklin Mts., Bajada 740 Tepic at 4000 ft. elev., 1 Aug. 1997 (1♀), R.D. Worthington (UTEP). HUDSPETH CO. Sierra Blanca, J.K. Adams (JKA). LA SALLE CO. Chaparral Wildlife Management Area, 29–30 Sep. 1989 (3♀), J. Schaffner (TAMU). KERR CO. Kerrville, no date (1♂), 21 Sep. 1906 (1♂), F.C. Pratt, Sep. 1902 (1♀) H. Lacy, Sep. 1902 (1♀), Sep. 1904 (1♀), no date (4♂, 7♀), Barnes Coll., 10 Sep (1♂), H. Lacey (UCB); Mountain Home, 22 Sep. 1906 (1♀), F.C. Pratt. KLEBURG CO. Kingsville, J.K. Adams (JKA). MONTAGUE CO. [No specific locality], 5 Aug. 1940 (1♂), 25 Aug. 1940 (1♂), 29 Aug. 1940 (1♂, 1♀), 1 Sep. 1940 (2♂, 1♀); 8 mi s Forestburg, 11 Sep. 1940 (1♀) (USNM), 11 Sep. 1949 (1♀), L.H. Birdwell (UCD). POTTER CO. Amarillo, 12 Aug. 1977 (1♀), R.E. Howard (BYU). RANDALL CO. Palo Duro Canyon State Park, 11 Sep. 1966 (1♀), A. & M.E. Blanchard. UVALDE CO. Garner State Park, 6 Oct. 1984 (1♂), E.C. Knudson (ECK); Sabinal, 5 Sep. 1910 (2♀), 10 Sep. 1910 (1♂), Oct. 1910 (1♀), F.C. Pratt. VAL VERDE CO. Del Rio, 4 Oct. 1994 (1♀), E.C. Knudson (ECK).

Discussion. Hardwick (1996) gave no explanation for synonymizing *S. alencis* with *S. chrysellus*. The species has a long flight period from early July to early October with the bulk of the specimens being collected in August and September.

Schinia ciliata Smith

(Figs. 12–13, 19, 24, 32–33, 42–43, 49)

Schinia ciliata Smith 1900: 488—Dyar 1903:190.—Barnes and McDunnough 1917: 39.—Franclemont and Todd 1983:159.—Poole 1989: 893.—Poole and Gentili 1996: 771.—Hardwick 1996: 187.

Diagnosis. *Schinia ciliata* most resembles *S. rufocostulata* Pogue and Harp, but the forewing fascia in *ciliata* varies in coloration from cinnamon to a mixture of rufous and black scales, and in *rufocostulata* the band is a bright immaculate rufous. The female papillae analis is narrower in *ciliata* with a pointed apex and in *rufocostulata* it is wider and the apex is more rounded. *Schinia ciliata* can be confused with specimens of *chrysellus* and *chryselloides* in which the median band is narrow and the reniform spot is more offset from the band. They can be separated by the coloration of the small patch of scales at the forewing apex. In *chrysellus* there is no distinct patch, but the apex is concolorous with the

terminal band, in *chryselloides* this area has a few black scales, and in *ciliata* this area is rufous.

Description. Male. *Head:* Frons cream, ventral lip produced (Fig. 19); vertex dark rufous; labial palp long, extends beyond frons, white; eyes large and globular. *Thorax:* Scales wide, dark rufous or white with dark rufous tips; fore femur cinnamon with a few white scales basally on outer surface, long fringe white, rufous at apex; tibia cinnamon, white in apical third, largest spine on inner side slender, round, 2 very slender spines dorsal to it, outer side with 2 slender spines and 1–2 very slender spines that become progressively shorter proximally; tarsi dirty white to grayish-brown with white apical rings; middle femur white to rufous; tibia cinnamon to rufous with white apical ring; tarsi cinnamon to grayish-brown with white apical rings; hind femur white; tibia pale cinnamon; tarsi pale cinnamon with white apical rings; underside white. *Forewing:* Length 9.04–11.07, mean 10.36 ± 0.57 mm (n=10). Ground color shiny white; basal patch cinnamon to rufous; median band narrow with slightly curved margins that can be black, cinnamon to rufous and variably overscaled with black; reniform spot round, concolorous with median band, can be variously ringed with black scales, narrowly contiguous with median band; terminal band white, apical spot cinnamon to rufous, inner margin an irregular cinnamon to rufous line, 4 black spots at margin between veins from apex to mid-wing; fringe white with brown tipped scales at apex; underside pale gray to gray, apical patch white, variably distinct white band at approximately 2/3 length below end of discal cell, white along posterior margin. *Hindwing:* Ground color shiny white; marginal band absent to faint, if present scales are brown to gray; fringe white. *Abdomen:* White; scent pockets and hair pencils on second sternite absent. *Genitalia* (Figs. 32–33): Uncus elongate, approximately 0.31–0.35 times length of valve, apex blunt with small hook; valve moderately elongate to elongate (length approximately 7.4–10 X width), costal margin gently curved, posterior margin angulate at 2/3 length, apex round; ampulla short (0.03 length of valve); corona with stout spines; sacculus with ventral margin produced; juxta rectangular, height greater than width, ventral margin U-shaped and more sclerotized than rest of juxta; saccus V-shaped; aedoeagus slightly curved, dorsodistal third with fine spines; vesica emerging ventrally, basal diverticulum present, 3 coils; cornuti finely scobinate.

Female. As in male except forewing length 9.45–11.2, 10.24 ± 0.61 mm (n=10). *Genitalia* (Figs. 42–43): Papilla analis a curved elongate triangle, apex pointed; posterior apophysis approximately 0.83–0.88 X length of anterior apophysis; ductus bursae membranous, elongate; appendix bursae shorter than corpus bursae, with 3 coils; corpus bursae ovate; signa 4 scobinate bars.

Type material. *Schinia ciliata* Smith: Female holotype is in USNM. Type locality: Hot Springs, New Mexico. Type examined.

Biology. Hardwick (1996) noted that *ciliata* larvae feed on broom snakeweed (*Gutierrezia sarothrae* (Asteraceae)) from observations of a population at Wickenburg, Arizona. This perennial plant occurs in dry, open, shortgrass and mixed prairies and accounts for

ciliata specimen records across its range, except in the northern plains of Wyoming and Montana where the moth has not yet been reported.

Distribution (Fig. 49). Southern California east to Utah, Arizona, Colorado, New Mexico, western Kansas and Oklahoma, and scattered throughout Texas.

Material Examined. All specimens are from the National Museum of Natural History (USNM) collection except as noted. **U.S.A.: ARIZONA:** COCHISE CO. Paradise, (1♂) Barnes Coll., 1925 (1♂, 1♀), O. Duffner, June (1♀), 1–7 Oct. (1♀), Barnes Coll.; Portal, Portal Lodge, 4700 ft., 11 Sep. 1994 (5♀), J.K. Adams (CEH); 1 mi S Portal, Cave Creek Ranch, 29–31 Aug. 1969 (1♂), 29–30 Aug. 1971 (1♀), E.G. Linsley (UCB); Portal, Portal Lodge at blacklights @ 4700 ft., 11 Sep. 1994 (5♂), J.K. Adams (CEH); Portal, 4–7 Sep. 1964, W. Gertsch (AMNH). COCONINO CO. Colorado River, Grand Canyon, river mile 166.5 L, old high water, 1 Sep. 2003 (2♀), R.J. Delph (NAU). GILA CO. Globe, 19 Sep. 1933 (1♀), 21 Sep. 1933 (1♂), ♂ genitalia slide USNM 48027, Parker; Globe (LACM). MARICOPA CO. Wickenburg, 2000 ft., em. Oct. 1987 (1♂, 2♀), reared from egg, 28 Sep. 1986 (1♀), 29 Sep. 1986 (1♀), D. & V. Hardwick (CNC). MOHAVE CO. No specific locality, 24–31 Aug. (1♀), Barnes Coll.; Colorado River, Grand Canyon, mi 198.0 R, new high water, 9 Sep. 2001 (2♂), J. Rundall (NAU); Wikieup, 3400 ft., 1 Oct. 1969 (2♀), D.F. Hardwick (CNC). PIMA CO. Redington, (2♀), Barnes Coll. **CALIFORNIA:** LOS ANGELES CO. 2 mi n Pinyon Flats, Palms to Pines Hwy., 1 Sep. 1946 (2♂, 2♀), C.I. Smith (UCB). RIVERSIDE CO. Palm Springs Sta., 9 Oct. 1955 (1♀), J.W. McSwain (UCB); Pinyon Crest, 22 Aug. 1987, R. Leuschner (AMNH). SAN BERNARDINO CO. Ivanpah Mountains, 21 Sep. 1940 (1♂), C. Henne; Providence Mts. 3 Oct. 1937 (1♂), D. Meadows; New York Mountains, 4400 ft., 24 Sep. 1990 (2♀), D. & V. Hardwick (CNC); Keystone Canyon, New York Mountains, 31 Aug. 1941 (1♀), C.I. Smith (UCB); Mountain Pass Station, Ivanpah Mts., 22 Aug. 1946 (1♂), C.I. Smith (UCB); nr. Sagamore Mine, New York Mountains, 3 Sep. 1945 (3♀), C.I. Smith (UCB). SAN DIEGO CO. Boulder Oak Camp Ground, 9 Aug. 1991 (2♂), J. Powell (UCB). **COLORADO:** ARAPAHOE CO. s of Manilla, Hwy. I-90 at Manilla Rd. @ 5486 ft., 21 Aug. 1999 (2♀), C. Harp (CEH), 23 Aug. 1999 (1♀), C. Harp (CEH). BACA CO. Picture Canyon, Comanche National Grassland, sw of Campo, 4290 ft., 25 Aug. 2002 (1♀), 25 Aug. 2004 (4m), M.G. Pogue and C.E. Harp; Picture Canyon, N of picnic area, sw of Campo, 4282 ft., 25 Aug. 2002 (1♀), M.G. Pogue and C.E. Harp; Picture Canyon at parking area, Comanche National Grassland, sw of Campo, 4225 ft., 29 Aug. 2002 (1♂, 5♀), C. Harp (CEH); s end Springfield, Hwy. 385/287, 4409 ft., 26 Aug. 2002 (2♀), M.G. Pogue and C.E. Harp, 28 Aug. 2002 (3♀), 30 Aug. 2002 (2♀), C. Harp (CEH), 28 Aug. 2003 (1♂, 2♀), C. Harp (CEH). DENVER CO. Denver, 24–30 Aug. (1♀), Barnes Coll. FREMONT CO. Penrose, gas station, 1 mi n of Hwy. #50 off Hwy. 115, 5293 ft., 7 Aug. 2002 (2♀), 16 Aug. 2002 (1♀), 17 Aug. 2002 (5♀), 24 Aug. 2002 (1♀), C. Harp (CEH). LARIMER CO. Ft. Collins, 6 Aug. 1931 (1♂), (CSU), 11 Aug. 1895 (AMNH), 13 Aug. 1895 (AMNH). LINCOLN CO. Limon, gas station, s of Hwy. I-70 @ exit #359, 5356 ft., 19 Aug. 1998 (3♀), C. Harp

(CEH). MESA CO. Colorado National Monument, east entrance, 4980 ft., 9 Aug. 1996 (1 ♂), B. Rodgers family (CSU); Colorado National Monument, mouth of Red Canyon, 23–24 July 1999 (5 ♂), J. Moore (CSU); Colorado National Monument, headquarters, nr. west entrance, 5800 ft., 17 Aug. 1996 (1 ♀), B. Rodgers family (CEH). OTERO CO. Comanche National Grassland, 15 mi S La Junta, 27 Aug. 2000 (1 ♀), 29 Aug. 2000 (1 ♂, 1 ♀), D.J. Wright (DJW); Vogel Canyon picnic area, 4340 ft., 18 Aug. 1997 (1 ♂), D.J. Wright (DJW). PUEBLO CO. Pueblo West, off Hwy. #50 at McCullough Blvd. @ 4968 ft., 25 Aug. 2001 (3 ♀), C. Harp (CEH). WELD CO. BLT, Nunn, 21 Aug. 1978 (3 ♂), J. Capinera (CSU); 0.8 mi N I-76 on E side of Co. Rd. 91, 4700 ft., 7 Aug. 1996 (1 ♀), D.J. Wright (DJW). **KANSAS:** ELLIS CO. Hays, Ft. Hays State University campus, 21 Aug. 1988 (1 ♀), 31 Aug. 1988 (1 ♂), 11 Sep. 1988 (1 ♀), 20–21 Aug. 1989 (2 ♀), C.A. Ely (CAE); 1 Sep. 1994 (1 ♀), 20 Aug. 1994 (1 ♀), P. Foster (CAE). FINNEY CO., 13 mi se Garden City, 2800 ft., 25 Aug. 1975 (1 ♂), Lafontaine & Bowen (CNC). LOGAN CO. 17 mi s Monterrey, 2600 ft. 26 Aug. 1975 (1 ♂), Lafontaine & Bowen (CNC). MORTON CO. 5 mi n, 2.5 mi w of Wilburton, 1 Sep. 1989 (1 ♀), C.A. Ely (CAE). PHILLIPS CO. 5 mi e, 1 mi s of Glade, 25 Aug. 1990 (1 ♀), C.J. Ochs (CAE). SEWARD CO. 13 mi ne Liberal, 2700 ft. 26 Aug. 1975 (1 ♀), Lafontaine & Bowen (CNC). THOMAS CO. Colby, 12 Aug. 1988 (1 ♀), V. Wranosky (CAE). **NEW MEXICO:** No specific locality So., 23–30 Aug. (1 ♀), 1–10 Sep. (1 ♀), O.C. Poling. BERNALILLO CO. Cedar Crest, e slope of Sandia Mtns. @ 7500 ft., 3 Aug. 1976, R. Holland (RHA); [no specific locality] (LACM). CHAVES CO. Roswell, Aug. (1 ♂), Cockerell. COLFAX CO. 6 mi s of Maxwell, Hwy. I-25 at mkr. #420 @ 6040 ft., 8 Aug. 2002 (9 ♀), C. Harp (CEH), 12 Aug. 2002 (3 ♀), C. Harp (CEH). DONA ANA CO. Las Cruces, 9 Sep. 1958 (1 ♂), J.G. Watts (NMSU), 12 Sep. 1994 (1 ♀), J.K. Adams (CEH). EDDY CO. White City, 17 Sep. 1963 (1 ♀), 17 Sep. 1968 (1 ♀) (AMNH), A. and M.E. Blanchard, 9 Sep. 1966 (1 ♂), Roshore. GUADALUPE CO. Hwy. eastbound rest area, I-40 at mkr. #252, 21 mi w of Santa Rosa, 5550 ft., 22 Sep. 2004, Pogue & Harp (6 ♂, 4 ♀), (6 ♂, 4 ♀) (CEH); Shell gas station, I-40 at Colonias exit, 23 Aug. 2004 (2 ♂), M.G. Pogue & C.E. Harp. HIDALGO CO. Lordsburg, (LACM). LINCOLN CO. Blackwater Cyn., e slope of Capitan Mtns., 1 mi e of Hwy. #368 @ 5500 ft., 22 Aug. 1982, R. Holland (RHA). LUNA CO. Deming, (1 ♂) genitalia slide USNM 46939, Coll. Brooklyn Mus., 1–7 Sep. (4 ♂, 13 ♀), ♂ genitalia slide USNM 48028, Barnes Coll.; Wemble, 8 Sep. 1939 (1 ♂, 1 ♀), (CNC). QUAY CO. San Jon, Hwy. #469 s of Hwy. I-40 @ 3989 ft., 12 Sep. 2003 (1 ♀), C. Harp (CEH). SANDOVAL CO. Jemez Springs, 12 Aug. (1 ♂), J. Woolgate (CNC). SAN MIGUEL CO. 2 mi w Romeroville, 6360 ft., 14 Aug. 1990 (1 ♂), D. E. Bowman (CSU). SOCCORRO CO. 8 mi [no direction] Florida, 28 Aug. 1967 (1 ♀), R.C. Bechtel (UCD); [no specific locality] (LACM). TORRANCE CO. Gran Quiviera, 1 Aug. 1992 (1 ♀), 9 Aug. 1991 (1 ♀), D.E. Bowman (CSU). UNION CO. Hwy. 402, mile marker 59, 4.4 mi s of Hwy 87, Clayton, 23 Aug. 2004 (1 ♂), M.G. Pogue; 5.3 mi nw of Hwy 87 on Hwy. 370, Clayton, 23 Aug. 2004 (2 ♂), M.G. Pogue. VALENCIA CO. Cubero, 18 Aug. 1948 (1 ♂) C. & P. Vaurie (AMNH). **NEVADA:** CLARK CO. 10 mi S

Mesquite, Virgin Mts., 4700 ft., 24 Aug. 24, 1963 (4m), R.C. Bechtel (UCD); 38 mi nw of Las Vegas, Lee Canyon @ 6900 ft., 29 July 1966, F., P., & M. Rindge (AMNH). **OKLAHOMA:** BEAVER CO. Lake Evans Chambers, 1 Sep. 1991 (2♂), John Nelson (ORU). BECKHAM CO. Sayre at blacklight, 3 Aug. 1993 (1♂), J.M. Nelson (ORU). CIMARRON CO., Black Mesa State Park, s end of Lake Carl Etling, 4296 ft., 29 Aug. 2002 (1♀), C. Harp (CEH), Black Mesa State Park at blacklight, 4 Sep. 1992 (2♀), J.M. Nelson (ORU), Black Mesa State Park, east end of primitive area, 24 Aug. 2004 (1♀), M.G. Pogue. HARMON CO. Hall Lake at blacklight, 4 Sep. 1993 (1♂), J.M. Nelson (ORU). HARPER CO. Buffalo-Doby Springs at blacklight, 6 Sep. 1993 (2♀), J.M. Nelson (ORU). TEXAS CO. Lake Optima at blacklight, 5 Sep. 1992 (1♂, 2♀), J.M. Nelson (ORU). **TEXAS:** BRAZOS CO. Bryan, 3 Sep. 1996, C.W. Bordelon (CWB). BREWSTER CO. Alpine, Davis Mountains, 1 Sep. 1960 (4♂, 2♀), ♂ genitalia slide USNM 47112, 2 Sep. 1960 (7♂, 2♀), ♂ genitalia slide USNM 48029, R.R. McElvare; Alpine, 9 Sep. 1963 (1♀), genitalia slide USNM 47111, 11 Sep. 1963 (1♂), A. & M.E. Blanchard; Big Bend National Park, Chisos Basin, 20 Aug. 1995, C.W. Bordelon (CWB). BRISCOE CO. Caprock Cyn. State Park, 3 Sep. 1996, C.W. Bordelon (CWB). BROWN CO. [no specific locality] (TLA). CAMERON CO. [no specific locality] (TLA). CHILDRESS CO. 10 mi n of Childress, 31 Aug. 1996, C.W. Bordelon (CWB). COTTLE CO. 8 mi nw Paducah, 1800 ft., 23 Sep. 1968 (1♀), D.F. Hardwick (CNC). CULBERSON CO. Guadalupe Mts. National Park, Williams Ranch, 7 Sep. 1991 (1♀), E.C. Knudson (ECK); Sierra Diablo WMA, 1 Sep. 1970, A. & M.E. Blanchard (AMNH). EL PASO CO. E. Montana Hwy., 20–24 Sep. 1995 (2♂), E.C. Knudson (ECK), (1♀) E.C. Knudson (CEH); Hueco Tanks State Park, 16–18 [no month] 1993 (1♀), E. Knudson (ECK). HUDSPETH CO. Sierra Blanca, J.K. Adams (JKA). JEFF DAVIS CO. Limpia Canyon, Davis Mountains, 4920 ft., 8 Aug. 1991 (1♂), E.H. Metzler (EHM). JIM HOGG CO. Hebbronville, 15 Nov. 1998, E.C. Knudson (ECK). KERR CO. [no specific locality] (TLA). RANDALL CO. Palo Duro Cyn. State Park, 31 Aug. 1996, C.W. Bordelon (CWB). REEVES CO. Pecos, 21 Sep. 1952 (1♂), R. Leuschner (UCD) (LACM). STARR CO. [no specific locality] (TLA). SUTTON CO. [no specific locality] (TLA). TARRANT CO. [no specific locality] (TLA). UVALDE CO. [no specific locality] (TLA). VAL VERDE CO. [no specific locality] (TLA). WASHINGTON CO. [no specific locality] (TLA). **UTAH:** GARFIELD CO. Starr Springs, 36 mi s Hanksville, 6300 ft., 27 Aug. 1971 (1♀), D.F. Hardwick (CNC). GRAND CO. 13 mi W Moab, 6200 ft., 26 Aug. 1971 (1♂, 1♀), D.F. Hardwick (CNC). JUAB CO. Eureka, (LACM). TOOELE CO. Stockton, 20 Aug. 1903 (1♂), 21 Aug. 1903 (1♂), T. Spalding (USNM), 22–23 July, T. Spalding (AMNH). UTAH CO. Dividend, (LACM). WASHINGTON CO. Springdale, 11–13 Sep. 1996 (1♂, 7♀), J. Powell (UCB); Beaver Dam Mtns., 23 Aug. 1986, P. Savage (AMNH); [no specific locality] (LACM).

Discussion. The amount of black scales in the forewing median band gives some specimens a darker band. As specimens wear the forewing fascia become lighter in color. The valve shape varies in the male genitalia from being quite elongate to moderately broad.

***Schinia rufocostulata* Pogue and Harp, new species**

(Figs. 14–15, 20, 25, 34–35, 44–45, 49)

ZOOTAXA

898

Diagnosis. *Schinia rufocostulata* is distinct from the other species in this group by possessing the bright rufous fascia and the more extensive rufous apical patch in the forewing. The black spots along the outer margin of the forewing are present in *ciliata*, but absent in *rufocostulata*. The underside of the forewing is mostly gray in *ciliata* and cream in *rufocostulata*. The labial palps are shorter than in *ciliata*.

Description. Male. *Head:* Frons cream, ventral lip produced (Fig. 20); vertex rufous; labial palp short, barely extends beyond frons, cream; eyes large and globular. *Thorax:* Scales wide, rufous; forefemur cream, slightly dark at apex, long fringe white; tibia cream, largest spine on inner side slender, round, 2 very slender spines dorsal to it, outer side with 2 slender spines and 1–2 very slender spines that become progressively shorter proximally; tarsi pale cinnamon with white apical rings; middle femur pale cinnamon; tibia pale cinnamon with cream apical rings; tarsi slightly darker than tibia with cream apical rings; hind femur cream; tibia pale cream; tarsi pale cream; underside white. *Forewing:* Length 9.06–10.04, mean 9.56 ± 0.58 mm (n=5). Ground color shiny white; basal patch cinnamon to rufous, usually a shade lighter than thorax; median band narrow with slightly curved margins, rufous; reniform spot round, concolorous with median band, narrowly contiguous with median band; terminal band white, with large rufous area encompassing apex and extending down costa almost to median band and down outer margin approximately 4/5 length, a distinct white apical spot, black spots at outer margin absent; short scales of fringe concolorous with rufous terminal patch, long hairs rufous at apex, rest white; underside cream with pale cinnamon along costa and near apex. *Hindwing:* Ground color shiny white; marginal band faint, pale cinnamon, widest at apex becoming absent toward anal angle; fringe white. *Abdomen:* Shiny tannish-white; scent pockets and hair pencils on second sternite absent. *Genitalia* (Figs. 34–35): Uncus elongate, approximately 0.33 times length of valve, apex blunt with small hook; valve moderately elongate (length approximately 8.3 X width), costal margin gently curved, posterior margin angulate at 2/3 length, apex round; ampulla short (0.02 length of valve); corona with stout spines; sacculus with ventral margin produced; juxta rectangular, height greater than width, ventral margin U-shaped and more sclerotized than rest of juxta; saccus V-shaped; aedoeagus slightly curved, dorsodistal third with fine spines; vesica uninflated.

Female. As in male except forewing length 9.72–9.86, 9.79 ± 0.10 mm (n=2). *Genitalia* (Figs. 44–45): Papilla analis an elongate triangle, apex round; posterior apophysis approximately 0.78 X anterior apophysis; ductus bursae membranous, elongate; appendix bursae shorter than corpus bursae, with 2 1/2 coils; corpus bursae ovate; signa 4 scobinate bars.

Type material. HOLOTYPE: ♀, Texas, Brewster Co., Dugout Wells, Big Bend National Park, 27 Aug. 1965, A. & M. E. Blanchard, USNM ENT 00220615, genitalia slide USNM 48031. Deposited in USNM.

Biology. Unknown.

Etymology: The specific epithet, *rufocostulata*, describes the unique character of the rufous terminal band extending down costa almost to the median band.

Distribution (Fig. 49). Known only from the type locality in southwestern Texas.

Material Examined. All specimens are from the National Museum of Natural History (USNM) collection except as noted. PARATYPES: Two males same locality and date as Holotype, ♂ genitalia slide USNM 48030, 7 Aug. 1964 (1♂), 13 Sep. 1971 (1♂), 13 Sep. 1971 (1♂), A. and M. E. Blanchard; 4 Sep. 1982 (1♂), 13 Sep. 1982 (1♀), E. C. Knudson (ECK).

Discussion. *Schinia rufocostulata* is known only from the type locality of Dugout Wells, in Big Bend National Park, Brewster Co., Texas. The apical area of the forewing is distinct in *rufocostulata* by having the rufous color of the terminal band extending down costa almost to the median band. This character is lacking in *ciliata*. The specimens show no variation in the median band color as in *ciliata*.

Acknowledgements

We thank Paul A. Opler, Colorado State University, Ft. Collins, CO and Edward C. Knudson, Houston, TX for loaning us specimens. For critically reviewing the manuscript and offering suggestions to make it better we thank David A. Nickle and M. Alma Solis, U.S. Department of Agriculture, Systematic Entomology Laboratory, Washington, DC, Peter J. Landolt, U.S. Department of Agriculture, Wapato, WA, and Clifford D. Ferris, Laramie, WY. We thank Jocelyn Gill, Canadian National Collection, Ottawa, Ontario, Canada for preparing the maps.

Literature Cited

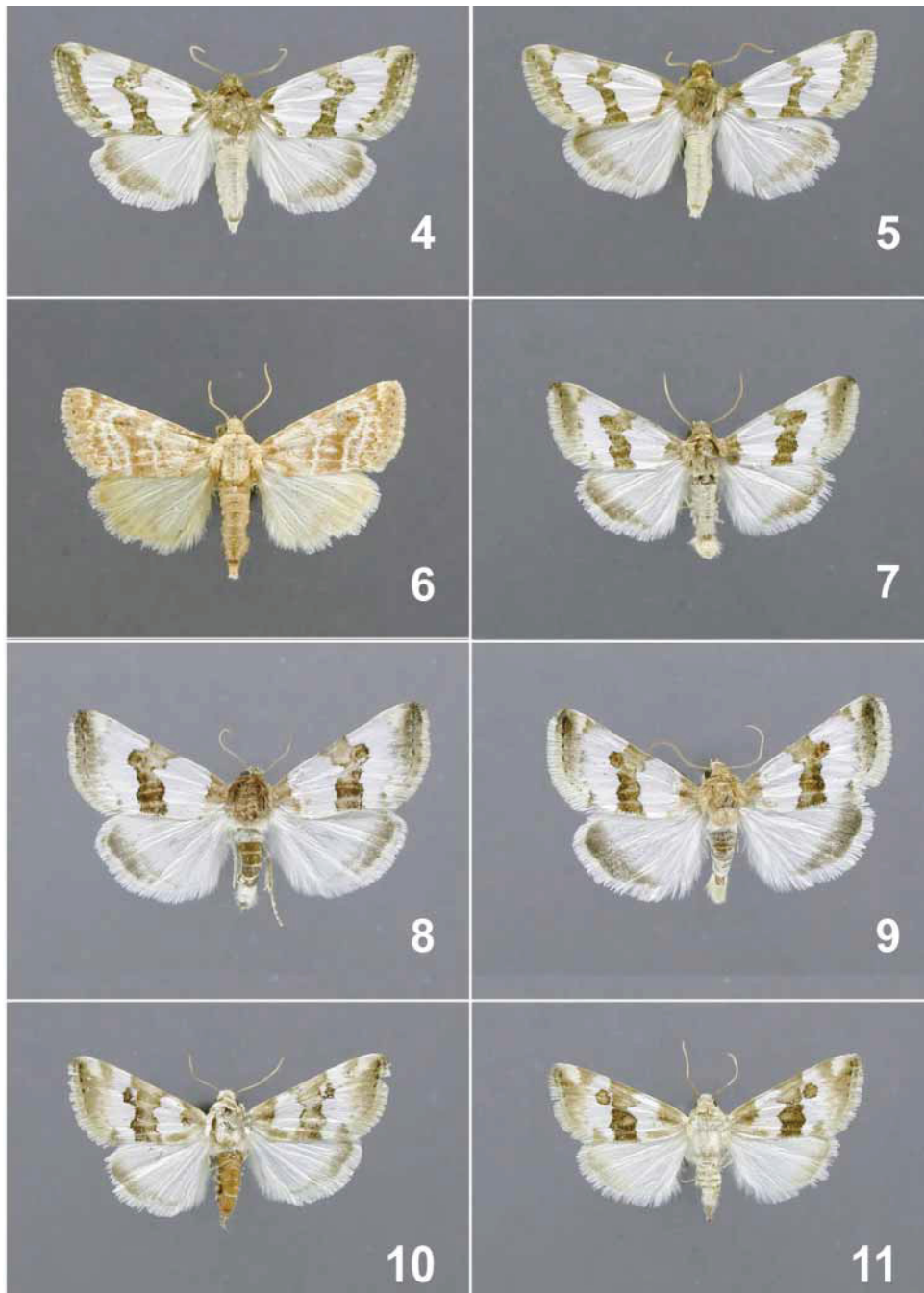
- Barnes, W. & McDunnough, J. (1917) *Check list of the Lepidoptera of boreal America*. Herald Press, Decatur, Illinois. ix, 392 pp.
- Covell, C.V. (1999) *The Butterflies and Moths (Lepidoptera) of Kentucky: An annotated Checklist*. Kentucky State Nature Preserves Commission, Scientific and Technical Series Number 6, Frankfort, Kentucky, xiv, 220 pp.
- Dyar, H.G. (1903 [1902]) A list of North American Lepidoptera and key to the literature of this order of insects. *Bulletin of the United States National Museum*, 52, i–xi, 1–723.
- Felder, R. & Rogenhofer, A.F. (1874) *Reise Oesterreichischen Fregatte Novara um die Erde in den Jahren 1857, 1859. Zoologischer Theil, Zweiter Band, Zweite Abtheilung, Lepidoptera. Heft 4*. Carl Gerold's Sohn, Wien, Plates 75–120 with associated letter press.
- Franclemont, J.G. & Todd, E.L. (1983) Noctuidae. In: Hodges, R.W., Dominick, T., Davis, D.R., Ferguson, D.C., Franclemont, J.G., Munore, E.G. & Powell, J.A. (Eds.), *Check list of the Lepidoptera of America North of Mexico*. University Press, Cambridge, pp. 120–159.

- Grote, A.R. (1874) List of the Noctuidae of North America. *Buffalo Society of the Natural Sciences*, 2, 1–77.
- Grote, A.R. (1875) *Check list of the Noctuidae of America, north of Mexico. I. Bombyciae and Noctuelitae (Nonfasciatae)*. Reinecke and Zesch, Buffalo, New York, 28 pp.
- Grote, A.R. (1882) *New checklist of North American moths*. [no publisher given]. 73 pp.
- Grote, A.R. (1883) Introduction to a study of the North American Noctuidae. *Proceedings of the American Philosophical Society*, 21, 134–176.
- Grote, A.R. (1890) *North American Lepidoptera. Revised checklist of the North American Noctuidae. Part 1. Thyatirinae - Noctuinae*. Homeyer and Meyer, Bremen, 52 pp.
- Grote, A.R. (1895) List of North American Eupterotidae, Ptilodontidae, Thyatiridae, Apatelidae and Agrotidae. *Abhandlungen des Naturwissenschaftlichen Vereins zu Bremen* 14, 43–128.
- Hardwick, D.F. (1996) *A monograph to the North American Heliothentinae (Lepidoptera: Noctuidae)*. David F. Hardwick, Ottawa, Ontario, 281 pp.
- Harvey, L.F. (1875) On new species of *Tricopsis* and *Homohadena* and remarks on *Homohadena induta*. *Canadian Entomologist*, 7, 17–118.
- Knudson, E., Bordelon, C. & Pogue, M.G. (2003) A new species of *Schinia* Hübner (Lepidoptera: Noctuidae: Heliothinae) from Texas, Oklahoma, and Louisiana. *Zootaxa*, 382, 1–7.
- McDunnough, J. (1938) Checklist of the Lepidoptera of Canada and the United States of America. Part 1. Macrolepidoptera. *Memoirs of the Southern California Academy of Sciences*, 1, 1–275.
- Pogue, M.G. (2002). A world revision of the genus *Spodoptera* Guenée (Lepidoptera: Noctuidae). *Memoirs of the American Entomological Society*, No. 43, 1–202.
- Pogue, M.G. & Harp, C.E. (2003a). Revised status of *Schinia unimacula* Smith (Lepidoptera: Noctuidae: Heliothinae). *Zootaxa*, 226, 1–8.
- Pogue, M.G. & Harp, C.E. (2003b). Systematics of *Schinia cupes* (Grote) complex: Revised status of *Schinia crotchii* (Hy. Edwards) (Lepidoptera: Noctuidae: Heliothinae). *Zootaxa*, 294, 1–16.
- Pogue, M.G. & Harp, C.E. (2003c). A review of the *Schinia regia* (Strecker) species complex with a description of a new species (Noctuidae: Heliothinae). *Journal of the Lepidopterists' Society*, 57, 197–203.
- Pogue, M.G. & Harp, C.E. (2004). A review of the *Schinia tertia* (Grote) species complex (Noctuidae: Heliothinae). *Zootaxa*, 473, 1–32.
- Poole, R.W. (1989) *Fascicle 118, Noctuidae. Lepidopterorum Catalogus (New Series)*. E.J. Brill and Flora and Fauna Publications, Leiden, xii, 1313 pp.
- Poole, R.W. & Gentili, P. (Eds.) (1996) *Nomina Insecta Nearctica. A check list of the insects of North America, Volume 3: Diptera, Lepidoptera, Siphonaptera*. Entomological Information Services, Rockville, Maryland, 1143 pp.
- Sample, J. C. 1996. A revision of *Heterotheca* sect. *Phyllothea* (Nutt.) Harmes (Compositae: Astereae): the prairie and montane goldenasters of North America. *University of Waterloo Biology Series*, No. 37, 1–164
- Smith, J.B. (1883) Synopsis of the North American Heliothinae. *Transactions of the American Entomological Society*, 10, 205–256.
- Smith, J.B. (1891) *List of Lepidoptera of boreal America*. P.C. Stockhausen, Philadelphia. v., 124 pp.
- Smith, J.B. (1893) A catalogue, bibliographical and synonymical, of the species of moths of the Lepidopterous superfamily Noctuidae, found in boreal America. *Bulletin of the United States National Museum*, 44, 1–424.
- Smith, J.B. (1900) A hundred new moths of the family Noctuidae. *Proceedings of the United States National Museum*, 22, 413–495.

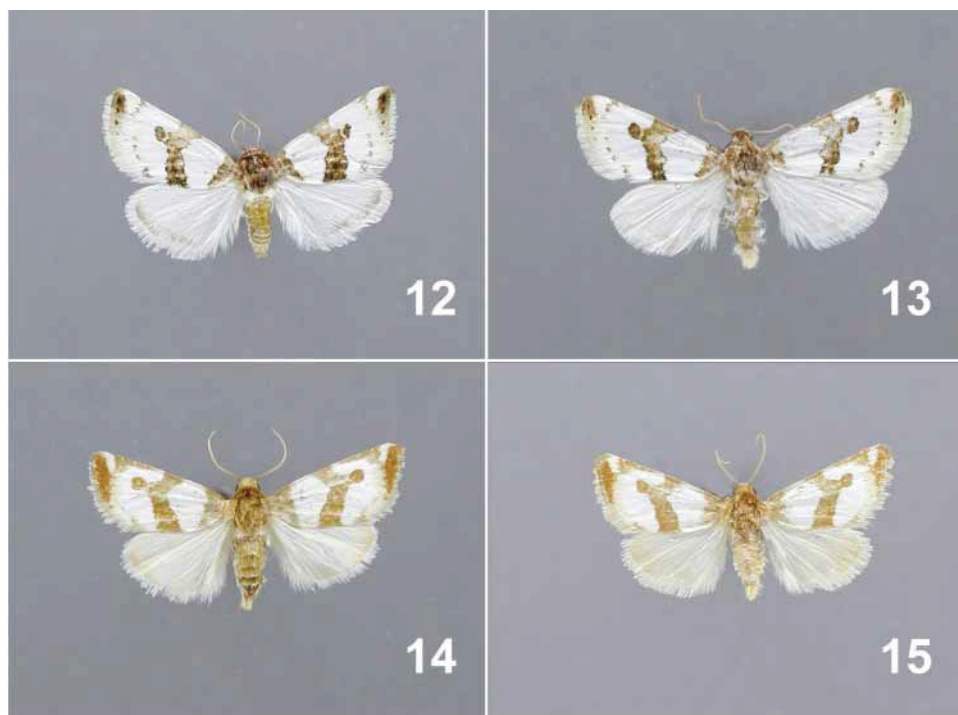
Strecker, F.H.H. (1877) *Lepidoptera, Rhopaloceres and Heteroceres Indigenous and Exotic; with Descriptions and colored Illustrations*. No. 14. Owen's Steam Book and Job Printing Office, Reading, Pennsylvania, pp. 125–134.



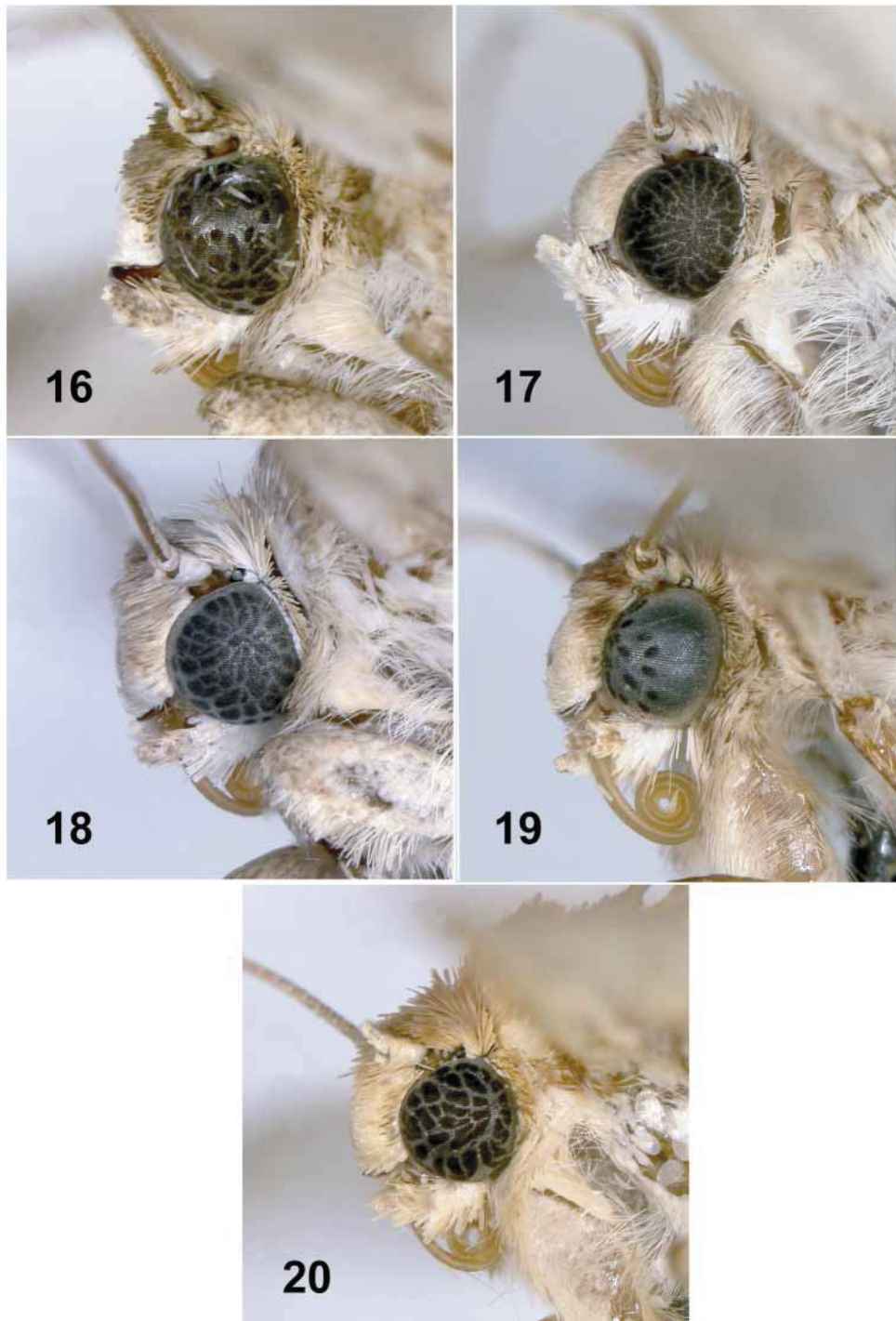
FIGURES 1–3. Adult. 1–2, *Schinia chryselloides*, female ovipositing on *Heterotheca villosa* var. *nana*, Colorado, Elbert Co. Elizabeth, open eroded shoulders s. of Hwy. #86 just s of the high school at 6341 ft. elev., 29 June 2002; 3, Host plant, *Amphiachyris dracunculoides*, for *Schinia chrysellus* in typical habitat, eroded red-clay prairies and savannahs, Oklahoma, Oklahoma Co., 3 mi sw of Luther, along Hwy. I-44 nr. Peebly Rd., 22 August 1992.



FIGURES 4–11. Adults. 4, *Schinia chrysellus*, male, Texas, Val Verde Co. Lake Walk, USNMENT 00220471; 5, *S. chrysellus*, male, Texas, Val Verde Co. Lake Walk, USNMENT 00220471; 6, *S. chrysellus*, male (*lanul* phenotype), Texas, USNMENT 00220456; 7, *S. chryselloides*, male, Texas, Cottle Co., Paducah, USNMENT 00220482; 8, *S. chryselloides*, female, Holotype, Colorado, Elbert Co., Elizabeth, lights for new grocery mall, USNMENT 00220214; 9, *S. chryselloides*, male, Colorado, Elbert Co., Elizabeth, lights for new grocery mall, USNMENT 00220211; 10, *S. alencis*, female, Texas, Brewster Co., Alpine, USNMENT 00220501; 11, *S. alencis*, female, Texas, Cottle Co., Paducah, USNMENT 00220513.



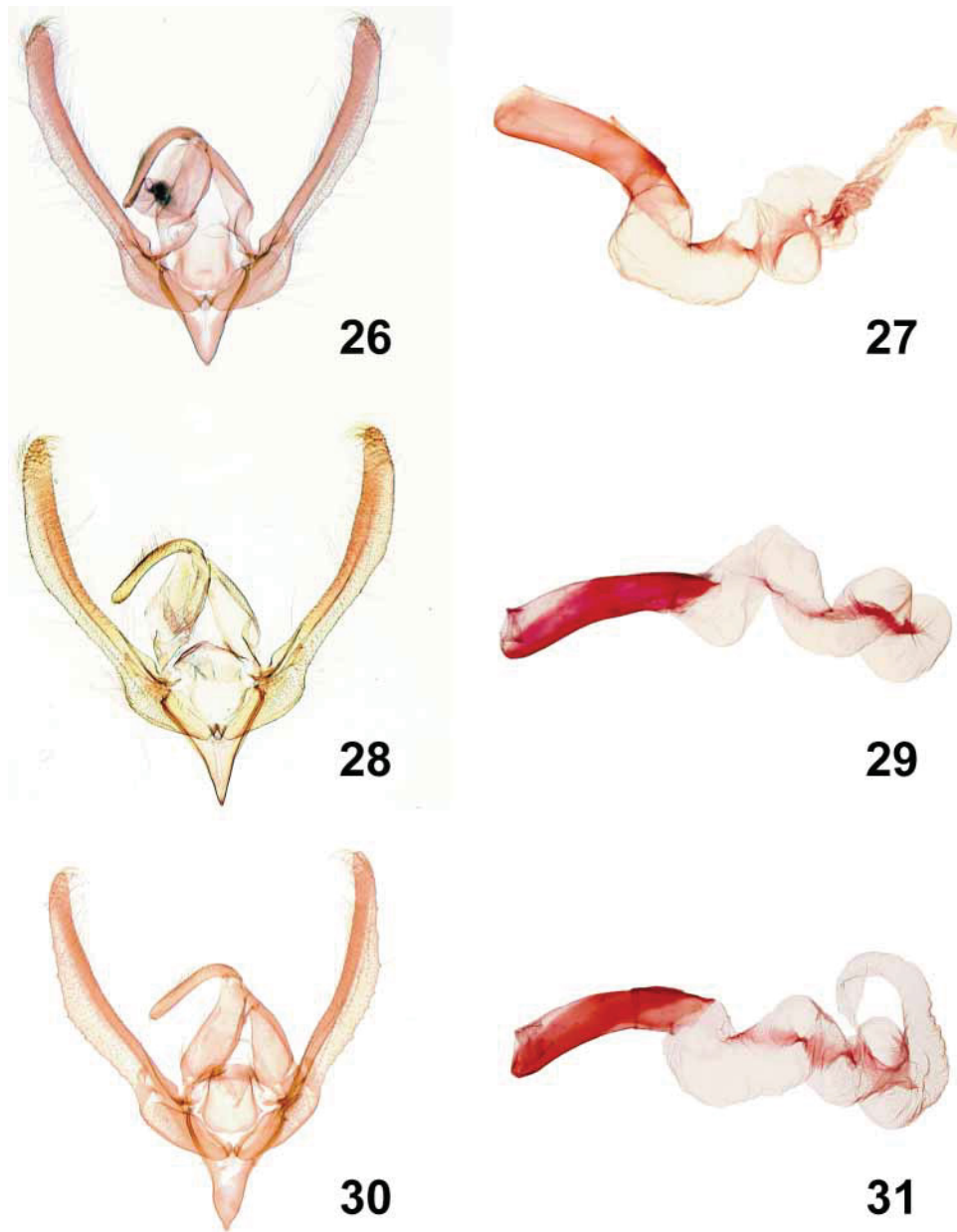
FIGURES 12–15. Adults. 12, *Schinia ciliata*, female, Colorado, Baca Co., Picture Canyon, N of Picnic Area, sw of Campo, 4282 ft., USNMENT 00144376; 13, *S. ciliata*, male, Texas, Brewster Co., Alpine, Davis Mountains, USNMENT 00220233; 14, *S. rufocostulata*, male, Texas, Brewster Co., Dugout Wells, Big Bend National Park, USNMENT 00220618; 15, *S. rufocostulata*, male, Texas, Brewster Co., Dugout Wells, Big Bend National Park, USNMENT 00220617.



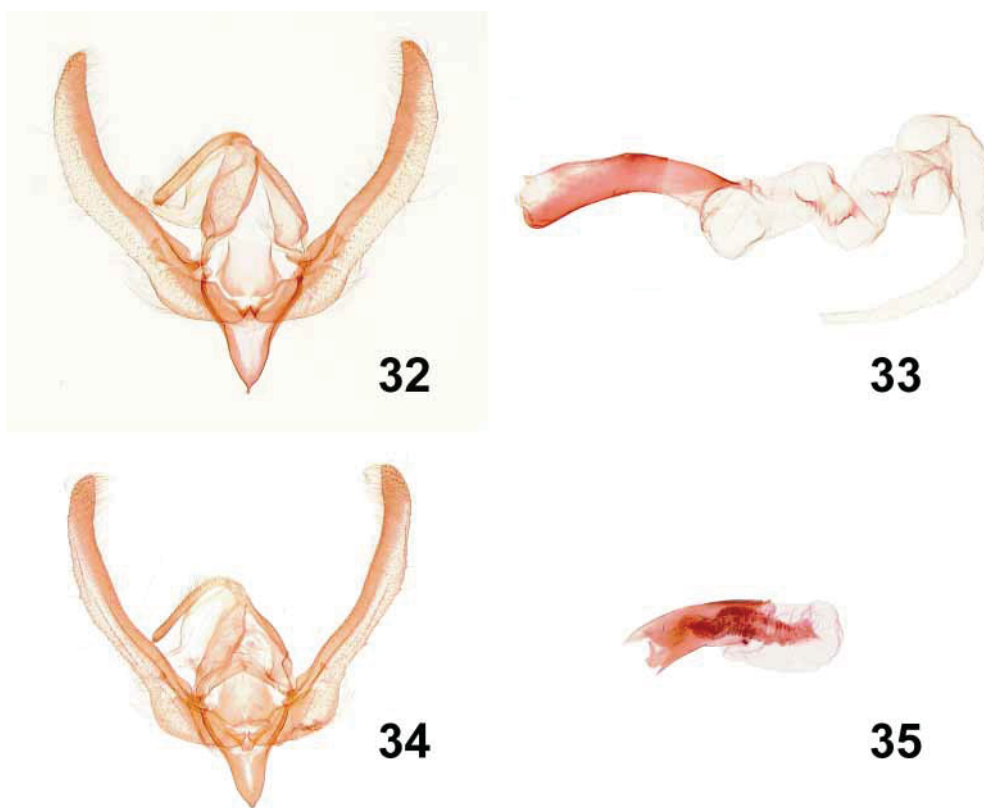
FIGURES 16–20. Heads. 16, *Schinia chrysellus*; 17, *S. chryselloides*; 18, *S. alencis*; 19, *S. ciliata*; 20, *S. rufocostulata*.



FIGURES 21–25. Foretibia showing form and arrangement of claws. 21, *Schinia chrysellus*; 22, *S. chryselloides*; 23, *S. alencis*; 24, *S. ciliata*; 25, *S. rufocostulata*.



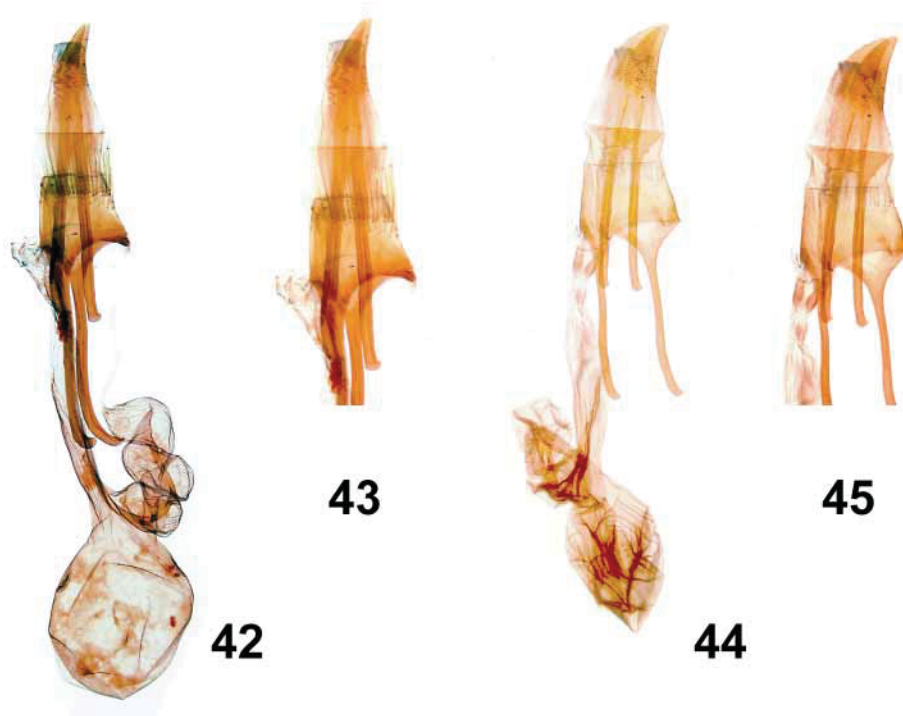
FIGURES 26–31. Male genitalia and aedeagus. 26, *Schinia chrysellus*; 27, *S. chrysellus*, aedeagus; 28, *S. chryselloides*; 29, *S. chryselloides*, aedeagus; 30, *S. alencis*; 31, *S. alencis*, aedeagus.



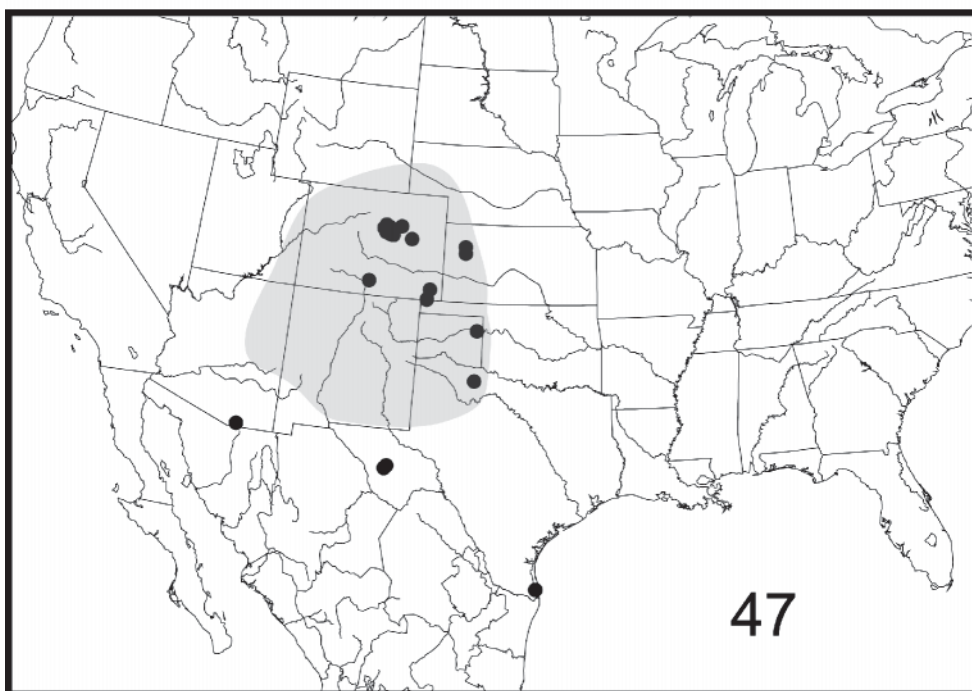
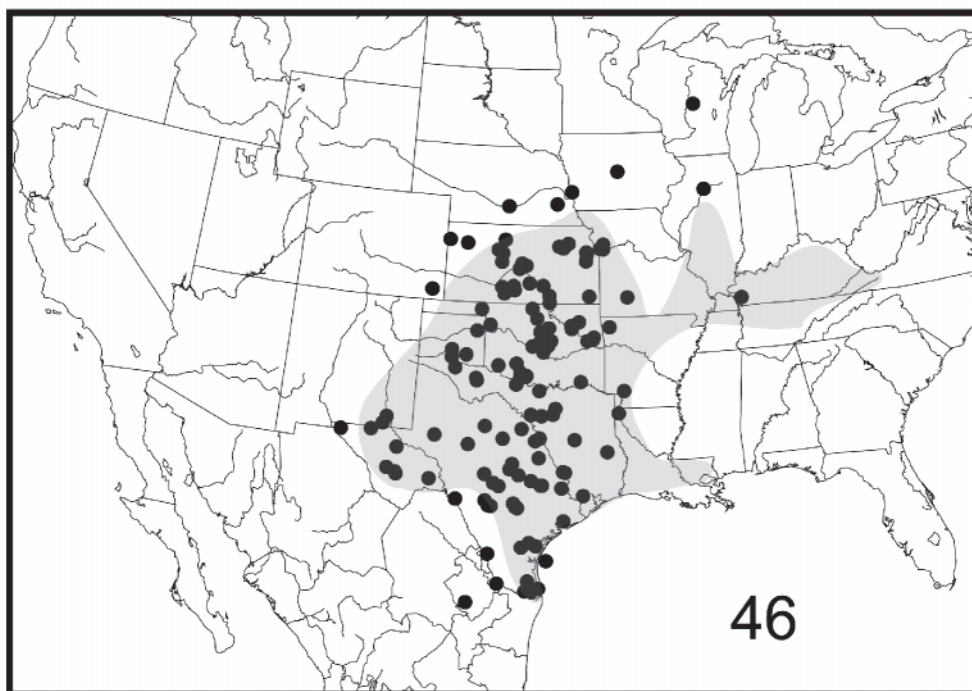
FIGURES 32–35. Male genitalia and aedeagus. 32, *Schinia ciliata*; 33, *S. ciliata*, aedeagus; 34, *S. rufocostulata*; 35, *S. rufocostulata*, aedeagus.



FIGURES 36–41. Female genitalia and papillae analis. 36, *Schinia chrysellus*; 37, *S. chryselloides*; 38, *S. alencis*; 39, *S. chrysellus*, papillae analis; 40, *S. chryselloides*, papillae analis; 41, *S. alencis*, papillae analis.



FIGURES 42–45. Female genitalia and papillae analis. 42, *Schinia ciliata*; 43, *S. ciliata*, papillae analis; 44, *S. rufocostulata*; 45, *S. rufocostulata*, papillae analis.



FIGURES 46–47. 46, Collecting localities for *Schinia chrysellus*, shaded area is distribution of host plant, *Amphiachyris dracunculoides* (Asteraceae); 47, Collecting localities for *Schinia chryseloides*, shaded area is distribution of host plant, *Heterotheca villosa* var. *nana* (Asteraceae).

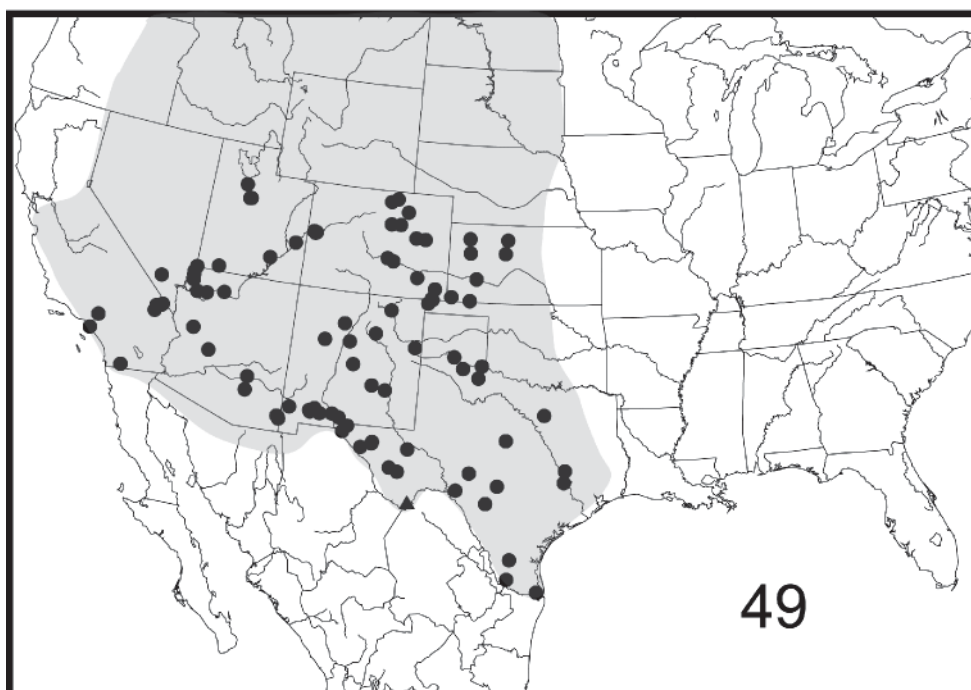
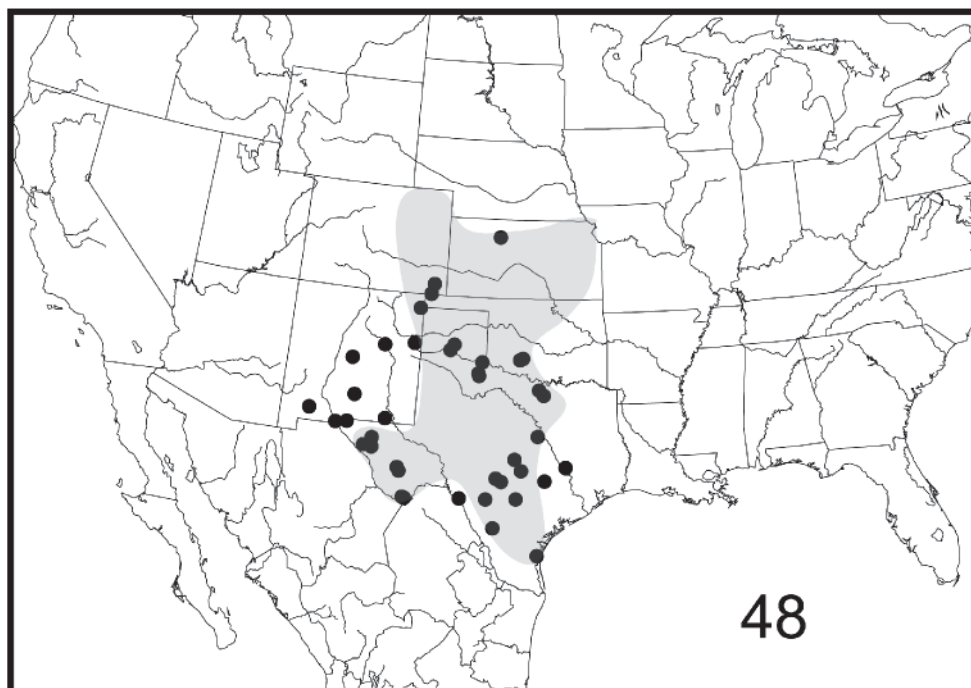


FIGURE 48–49. 48, Collecting localities for *Schinia alencis*, shaded area is distribution of suspected host plant, *Heterotheca canescens* (Asteraceae); 49, Collecting localities for *Schinia ciliata* (closed circles), shaded area is distribution of host plant, *Gutierrezia sarothrae* (Asteraceae); *S. rufocostulata* (triangle).